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NATIONAL DAM SAFETY PROGRAM. POHICK CREEK DAM SITE NUMBER 4 (IN--ETC(U)
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Name Of Dam: POHICK CREEK DAM SITE NO. 4
Location: FAIRFAX COUNTY
Inventory Number: VA. 05922

LEVEL II

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED FOR

NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

BY

DEWARD M. MARTIN & ASSOCIATES
WILLIAMSBURG, VIRGINIA
AUGUST, 1979

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18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam and appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

POHICK CREEK DAM SITE # 4
FAIRFAX COUNTY, VIRGINIA
INVENTORY NO. VA 05922

POTOMAC RIVER BASIN

Name of Dam: Pohick Creek Dam Site # 4
Location: Fairfax County
Inventory Number: VA 05922

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Prepared For

NORFOLK DISTRICT CORPS OF ENGINEERS
803 Front Street
Norfolk, Virginia 23510

by

Deward M. Martin & Associates, Inc.
July 1979

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam:	Pohick Creek Dam Site Site # 4
State:	Virginia
County:	Fairfax
USGS Quad Sheet:	Fairfax, Virginia
Stream:	Pohick Creek
Date of Inspection:	May 30, 1979

Pohick Creeek Flood Retarding Dam # 4 is an earth embankment 1,010 feet long and 42 feet high. It is located south of Fairfax, Virginia, along State Route 651 about one half mile east from the intersections of State Routes 654 and 651. The dam was built in 1976-77 in accordance to the design plans prepared by the Soil Conservation Service. Plans are available from the Office of the Owner, Fairfax County Department of Public Works. The principal spillway is a 9 foot x 3 foot concrete riser and the emergency spillway is a 100 foot wide grass channel which curves to the left.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the spillway is rated as adequate. The freeboard hydrograph as computed by the Soil Conservation Service (SCS) is essentially equal to the PMF which was selected as the Spillway Design Flood. The freeboard hydrograph is used to establish the minimum top of dam elevation, and therefore the spillway will pass the SDF without overtopping. The SDF will cause a velocity of 15.8 feet per second at a depth of water of 7.7 feet in the emergency spillway. This flow will be hazardous to property and life in the houses now being constructed (after the emergency spillway was in place) in direct line with the axis of the emergency spillway. The depth of water at the curve in the emergency spillway and the material directing the water around this curve must be studied, and if needed, appropriate remedial action must be taken to avoid damage to property or possible loss of life.

It is recommended that the Owner, at his own expense, secure the services of a professional engineer to prepare a program of investigation of the curve in the emergency spillway. The program set up by the owner should be such that he can reach an agreement acceptable to the Commonwealth of Virginia for a reasonable time for the investigation and time of completion of any remedial measures required. The program should be established within 3 months after the date of notification by the Governor of the Commonwealth of Virginia.

Prepared By: Paul Seiler

PAUL SEILER, P.E.
Deward M. Martin & Associates

Submitted By: Original signed by JAMES A. WALSH

JAMES A. WALSH, P.E.
Chief Design Branch

Recommended By: ORIGINAL SIGNED BY: CARL S. ANDERSON, JR.

for JACK G. STARR, P.E.
Chief, Engineering Division

Approved By: Original signed by: Douglas L. Haller

DOUGLAS L. HALLER
Colonel, Corps of Engineers
District Engineer

Date SEP 21 1979

POHICK CREEK DAM SITE # 4

TABLE OF CONTENTS

Top of Dam

Downstream Face of Dam and Toe Drain

SECTION 1

PROJECT INFORMATION

1.1 General:

1.1.1 Authority: Public Law 92-367, 8 Aug 72 authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams through the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Appendix V , Reference 4). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Pohick Creek Dam Site # 4 is a zoned earth embankment 1,010 feet in length and 42 feet high from elevation 310.75 at the top of the dam to elevation 269 at the streambed at the downstream toe of the dam. The upstream slope is 2-1/2(H):1(V) from the top of the dam down to elevation 288.5 where there is a 10 foot wide bench just above normal pool. Below the berm the upstream slope is 3(H):1(V). The downstream slope is 2-1/2(H):1(V). There is a cutoff trench about 10 feet deep cut into the existing ground the full length of the embankment. The core in the embankment is 10 feet wide at elevation 300 and has slopes of 2(H):1(V). The principal spillway consists of a riser structure of a 36-inch diameter vertical pipe and a concrete box culvert from the riser to the toe of the embankment. There are internal drains placed horizontally in back of the toe which drain through the outlet wingwalls into the discharge channel. The emergency spillway which is located at the right end of the embankment is a 100 foot wide grassed spillway at elevation 300 with 3(H):1(V) side slopes. The draw down of the lake is through the box culvert.

1.2.2 Location: Pohick Dam is located south of Fairfax, Virginia along State Route 651. From State Route 236 in Fairfax, travel 2.4 miles south to State Route 654, travel east on State Route 654 2.1 miles to State Route 651 and then east on State Route 651 about 0.5 mile to Rabbit Branch of Pohick Creek. The dam is 200 feet north of State Route 651.

1.2.3 Size Classification: The dam is 42 feet high and has a storage capacity of 3,000 acre-feet. The dam is classified as intermediate according to height.

1.2.4 Hazard Classification: The dam is immediately upstream from newly constructed residences and State Route 651. The estimated number of residents is 15 people within about 300 feet of the crest of the emergency spillway. The classification of this dam is high hazard in accordance with Section 2.1.2 of the Recommended Guidelines for Safety Inspection of Dams, published by the Department of the Army, Office of the Chief of Engineers(OCE). The hazard classification used to categorize the dams is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: Fairfax County, Virginia.

1.2.6 Purpose of Dam: The Pohick Creek Dam is intended for flood control. The lake is used for recreation. No swimming is permitted.

1.2.7 Design and Construction History: The dam was designed by the U S Department of Agriculture Soil Conservation Service. The dam was constructed by Pleasant Excavation Company, Inc. in 1976-77. Soil information was obtained for the design and as-built plans are retained in the files of the Soil Conservation Service.

1.2.8 Normal Operational Procedures: The Fairfax County Department of Public Works is responsible for operation. The principal spillway operates in response to the pool level in the lake. The riser platform has a manual control to drain the lake. Mowing and trash removal are done by the Department of Public Works. The Department of Public Works will make annual visual inspections of the dam site each October.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 3.80 square miles.

1.3.2 Discharge at Dam Site: The maximum discharge at the dam site is unknown.

Principal Spillway
pool level at top of dam . . . . . 197 c.f.s.

Emergency Spillway
pool level at top of dam . . . . . .12,100 c.f.s.

1.3.3 Dam and Reservoir Data: Data pertinent to the dam and reservoir are shown in the following table:

Table 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet m.s.l.	Reservoir Capacity Area acres	Acre, feet	Watershed inches	Length feet
Top of Dam	310.75	171.0	2,558	12.6	6,300
Maximum pool design surcharge	303.6	121.0	1,498	7.4	5,400
Emergency spillway crest	300.0	99.3	1,098	5.4	4,700
Principal spillway crest	287.0	37.5	258	1.3	3,100
Streambed at downstream toe of dam	269+	- -	--	--	--

SECTION 2

ENGINEERING DATA

2.1 Design: The U S Department of Agriculture, Soil Conservation Service (SCS) designed and prepared the contract plans. Construction was completed in 1977. Plans are available from the SCS. The SCS has soil samples and analyses for the design and control during construction. In the period from 1970-1972, the SCS prepared design calculations from the results of the soil analyses. The calculations are included in Appendix IV.

*2.1.1 Geologic Setting of the Dam Site: Pohick Creek Dam Site # 4 is located in the Piedmont Geologic Physiographic Province. The underlying bedrock at the site is within the vicinity of the Wissahickon Formation. The bedrock is generally a hard weathered quartz-muscovite (sericite) schist, locally chloritic. The rock exhibits foliation which generally strikes northeasterly and dips 60° northwest. This foliation is best displayed where biotite flakes or iron and manganese exodes are present in the schist. The soils which are derrived from weathering of this formation consisted of micaceous silts, sandy silts, and silty or clayey sands.

*2.1.2 Geologic Investigation: Geologic Investigations of the site were conducted by the Soil Conservation Service in May 1979 and May 1972. The 1970 investigation was based on test pits; the 1972 investigation included test borings.

2.1.3 Stability Analysis: Design calculations indicate that the cutoff trench material in several samples tend to allow piping, but since the questionable samples are isolated examples and a 20 foot wide cutoff trench was proposed, the embankment design will be designed as proposed (See Appendix IV, Page 12.) The foundation of the dam generally consists of low plasticity silts and clays, CL and ML, which are partly residual, alluvial and coluvial in origin. Also interbedded in the foundation soils are silty sands, SM, and silty quartz gravels, GM. Depth of foundations soils varied from 7.0 to 15.0 feet. The abutments generally consist of shallow silty clay (ML) above a layer of silty gravel (ML-GM.) Depth to bedrock is approximately 12 feet.

The embankment of the dam consists of two zones. Zone I, the dam core and cutoff trench, is constructed from the CL-ML material at the site. Zone II, the dam shell, is constructed from the GM material at the site. The cutoff trench generally extended to the top of the weathered schist or below the depth of the highly permeable material. A drainage system is located in the downstream embankment to intercept the phreatic water and foundation abutment seepage.

Stability analyses were conducted for the original design by the SCS. A safety factor of 1.8 was obtained for the full drawdown analysis of the upstream side. A safety factor of 1.63 was obtained for the downstream side under steady seepage. The analysis of the downstream side was based on an embankment without a drainage system; therefore, the actual factor of safety for the downstream side under steady seepage may be higher. 2-1

2.2 Construction of the Dam: Construction records were not available; however, the SCS inspected the construction and the dam was built according to the design requirements. As-built plans indicate small differences in elevation at the top of the dam but no changes in placement of materials from those recommended in the design.

*2.3 Evaluation: The geotechnical data available concerning the foundation soils and abutments, as well as the embankment soils, are considered adequate.

*Information provided by Law Engineering Associates of Virginia

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 30 May 1979 inspection are recorded in Appendix III. At the time of the inspection the pool elevation was at 287.0 feet m.s.l., or the normal pool elevation. No flow was passing through the spillway. There are no known past inspection reports available.

3.1.2 Dam: The embankment is in good condition with no seepage, cracks, sloughing, or settlement observed. There are no visible horizontal or vertical misalignments in the dam. The only problems observed involved erosion. Some erosion is evident on the left bank of the reservoir, about 50 feet from the end of the left junction of the embankment and abutment. There was also some minor erosion in the vicinity of the toe drain at the left end of the dam. No riprap was in place at the water edge along the berm on the upstream face of the dam. There is no visible erosion at the shore line.

3.1.3 Appurtenant Structures: Observations of the principal spillway concrete riser were made from the embankment and no deterioration was noted. The impact basin is in good condition with no deterioration noted.

3.1.4 Emergency Spillway: The 100-foot wide vegetated channel is in good condition. The spillway channel is adjacent to a house which is on higher ground and to the right of the spillway. Any undercutting at this point would jeopardize the house.

In addition, the spillway channel is directed to an area which presently has new construction of houses. The channel flow is expected to turn left toward the discharge channel just before the water would flow into the new construction site. The new construction site has an estimated finish grade approximately 305 feet m.s.l., which is 5 feet above the spillway channel.

3.1.5 Reservoir Area: The surrounding area is wooded with some housing development. There is no shoreline erosion or apparent slope failures. No information is available pertaining to sedimentation.

3.1.6 Downstream Channel: The channel is shallow and narrow, but sufficient for most flows. Overbanks contain heavy brush and trees. The flood plain is about 600 feet wide. There are about 20 homes near the left abutment.

3.2 Evaluation: The visual observations indicated the embankment, principal spillway and emergency spillway to be in good condition. However, surface erosion should be corrected. Flow of water in the emergency spillway for the PMF has the potential for property damage and loss of life.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure: Cleaning of the debris screens are the only operations required in relation to routing water through the dam.

4.2 Maintenance: A routing maintenance plan has been established for the Pohick Creek Dam Site # 4 by the Fairfax County Department of Public Works. The plan includes an annual on-site inspection of the dam, principal spillway and appurtenances and emergency spillway. The plan also includes maintaining the vegetation, earth dams, structures, and access road. Details of the plan are shown in Appendix IV.

4.3 Warning System: There is no warning system established by the owner to be followed in case of emergency.

4.4 Evaluation: The operational procedures are very well planned as indicated in the Operational & Maintenance Plan (See Appendix IV.)

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: Normal pool (elevation 287.0 feet m.s.l.) is maintained by the crest of the concrete riser. The concrete riser crest elevation was established at an elevation sufficient to store the 100-year sediment accumulation. The crest (elevation 300.0 feet m.s.l.) of the emergency spillway was established at the elevation needed to store the 100-year flood. The elevation at the top of the dam (310.75 feet m.s.l.) was established by the hydrograph. The freeboard hydrograph is that computed from rainfall comparable to the Probable Maximum Precipitation (PMP) as used by the Corps of Engineers and is therefore comparable to Probable Maximum Flood (PMF).

5.2 Hydrologic Records: No rainfall or stream flow records were available at the dam site.

5.3 Flood Experience: The reservoir has not experienced any major floods.

5.4 Flood Potential: Design features of the dam and reservoir were established by the SCS by routing the principal spillway, the emergency spillway, and the freeboard hydrographs. Hydrograph data was determined by using the SCS-National Engineering Handbook-Chapter 4, Hydrology with the time of concentration and curve numbers established by basin characteristics.

5.5 Reservoir Regulations: Pertinent dam and reservoir data are shown in Table 1.1, paragraph 1.3.3.

Regulation of flow from the reservoir is automatic. Normal flows are maintained by the riser crest at an elevation of 287.0 feet m.s.l. Water flowing over the riser crest passes through the dam in a 36-inch diameter conduit. Water also flows past the dam through the ungated, vegetated, emergency spillway in the event water in the reservoir rises above an elevation of 310.75 feet m.s.l.

Outlet discharge capacity for the principal spillway and emergency spillway, reservoir area and storage capacity, hydrograph data, and routings were taken from the SCS Design Report. In routing hydrographs through the reservoir, it was assumed that the initial pool level was at the principal spillway crest.

5.6 Overtopping Potential: The probable rise of the reservoir and other pertinent information on reservoir performance are shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

Item	Normal	Hydrographs: Principal Spillway	Hydrographs: Emergency Spillway	Hydrographs: Free Board (a)
Peak flow, c.f.s.				
Inflow	3	4,298	8,210	24,600
Outflow	--	169	2,050	12,400
Peak elevation, ft., m.s.l.	--	300.3	303.6	310.75
Emergency Spillway (b) (elevation 300.0 ft., m.s.l.)				
Depth of flow, feet	--	--	2.2	7.7
Average velocity, f.p.s.	--	--	8.5	15.8
Duration of flow, hours	--	--	7	10
Non-overflow Section (elevation 310.75 ft., m.s.l.)				
Depth of flow, feet	--	--	--	--
Average velocity, f.p.s.	--	--	--	--
Total duration of overtopping hours	--	--	--	--
Tailwater elevation ft, m.s.l. (C)	286.6±	—	—	—

(a) PMF by Corps of Engineers standards.

(b) Depth and velocity estimates based on critical depth at control section.

(c) Tailwater at time of inspection.

5.7 Reservoir Emptying Potential: A 36-inch control gate on the upstream face of the riser at elevation 272.0 is available for dewatering the reservoir. The gate will permit withdrawal of about 108 c.f.s with the reservoir level at the crest of the principal spillway and essentially dewater the reservoir in about 3 days.

5.8 Evaluation: Pohick Creek Dam Site # 4 is an "intermediate" size, "high" hazard dam requiring evaluation for a Spillway Design Flood (SDF) equal to the PMF. The SCS freeboard hydrograph is essentially equal to the Corps of Engineers PMF hydrograph. The freeboard hydrograph was used to establish the top of the dam elevation of 310.57 feet m.s.l. Therefore, the spillway will pass the SDF without overtopping. The SDF will overtop the emergency spillway by a maximum of 7.7 feet with an average critical velocity of 15.8 fps and remain above the emergency spillway about 10 hours.

SECTION 6

STRUCTURAL STABILITY

*6.1 Dam Construction: The embankment of the dam consists of two zones. Zone 1, the dam core and cutoff trench, is constructed from the CL-ML material at the site. Zone II, the dam shell, is constructed from the GM material at the site. The cutoff trench generally extended to the top of the weathered schist or below the depth of the highly permeable material. A drainage system is located in the downstream embankment to intercept the phreatic water and foundation abutment seepage.

Stability analyses were conducted for the original design by the SCS. A safety factor of 1.8 was obtained for the full drawdown analysis of the upstream side. A safety factor of 1.63 was obtained for the downstream side under steady seepage. The analysis of the downstream side was based on an embankment without a drainage system; therefore, the actual factor of safety for the downstream side under steady seepage may be higher.

The as-built outer dam section consists of a 14 foot wide crest at elevation 310.75, a 2.5(H):1(V) upstream embankment with a 10 foot bench at elevation 287.5 which extends to the foundation at a 3(H):1(V) slope and a 2.5(H):1(V) downstream slope extending to the foundation. The central core is 14 feet wide at its top, elevation 300.0 and extends to the foundation at a 2(H):1(V) slope. The key trench, which extends into the abutments, is 20 feet wide at its bottom, varies in depth, and has side slopes of 2(H):1(V).

*6.2 Foundation and Abutments: The abutments have no signs of cracking. Analyses of the soil samples of the foundation and abutments area were considered in the stability analysis. The bedrock underlying the flood plain and abutments is deeply weathered schist.

*6.3 Stability analyses: Stability analyses performed by the SCS indicated a factor of safety of at least 1.6. These analyses were performed in connection with the orifinal design of the dam. The SCS reported the results as follows:

> The maximum section was analyzed using a modified Swedish Circle method and the sliding block method of the Department of Navy Bureau of Yards and Docks (DM-7 Design Manual.) Shear strength parameters of the angle of internal friction $\emptyset$=23 degrees and cohesion C= 700 pounds per square foot (PSF) were used for the embankment and $\emptyset$ of 35 degrees and c = 0 psf for the foundation. Strength parameters are based on total stress values obtained from consolidated undrained triaxial tests on samples compacted to 95% of Standard Proctor maximum density and then allowed to soak for 7 days. A safety factor of 1.8 was obtained for the full drawdown analysis of the 2-1/2 :1 over 3:1 upstream slope with a 10-foot berm at elevation 287.0. The downstream 2-1/2:1 slope without a drain yielded a safety factor of 1.63.

The floodplain section was analyzed using a modified Swedish Circle method. Safety factors obtained for this analysis were 1.79 for the 2-1/2:1 over 3:1 upstream section, and 1.78 for the 2-1/2:1 downstream section.

*6.4 Evaluation: The shear strength parameters used is the stability analyses are considered reasonable for the type of materials used on construction of the dam. The dam structure does not appear to have changed since its construction. Therefore, the structural stability of the dam appears good as indicated by its factor of safety of 1.6. In addition, a downstream drain was added to the dam and not considered in the stability analyses. Therefore, the safety factor value of 1.6 may be considered conservative.

SECTION 7

ASSESSMENT AND REMEDIAL MEASURES/RECOMMENDATIONS

7.1 Dam Assessment: No deficiencies were discovered during the field inspection and office analyses which would indicate the need for emergency attention. The dam and appurtenant structures are generally in good overall condition. However, emergency attention is needed to those new houses which were constructed after the emergency spillway was in place. Serious consideration, such as preparing an engineering study to divert water should be given before people are permitted to live in the houses.

Using the Corps of Engineers' screen criteria for initial review of the spillway adequacy, the PMF was selected as the SDF for the "intermediate" size and "high" hazard classification of Pohick Creek Dam Site # 4. The freeboard hydrograph as computed by the SCS is essentially equal to the PMF. The freeboard hydrograph is used to establish the minimum top of the dam elevation, and therefore the dam will pass the SDF without overtopping. The SDF will cause a velocity of 15.8 feet per second at a depth of water of 7.7 feet in the emergency spillway.

The recommended remedial measures are not considered urgent and, therefore, may be accomplished as part of the annual maintenance and inspection program.

7.2 Recommended Remedial Measures:

1) Install a staff gage to monitor reservoir levels above normal pool.

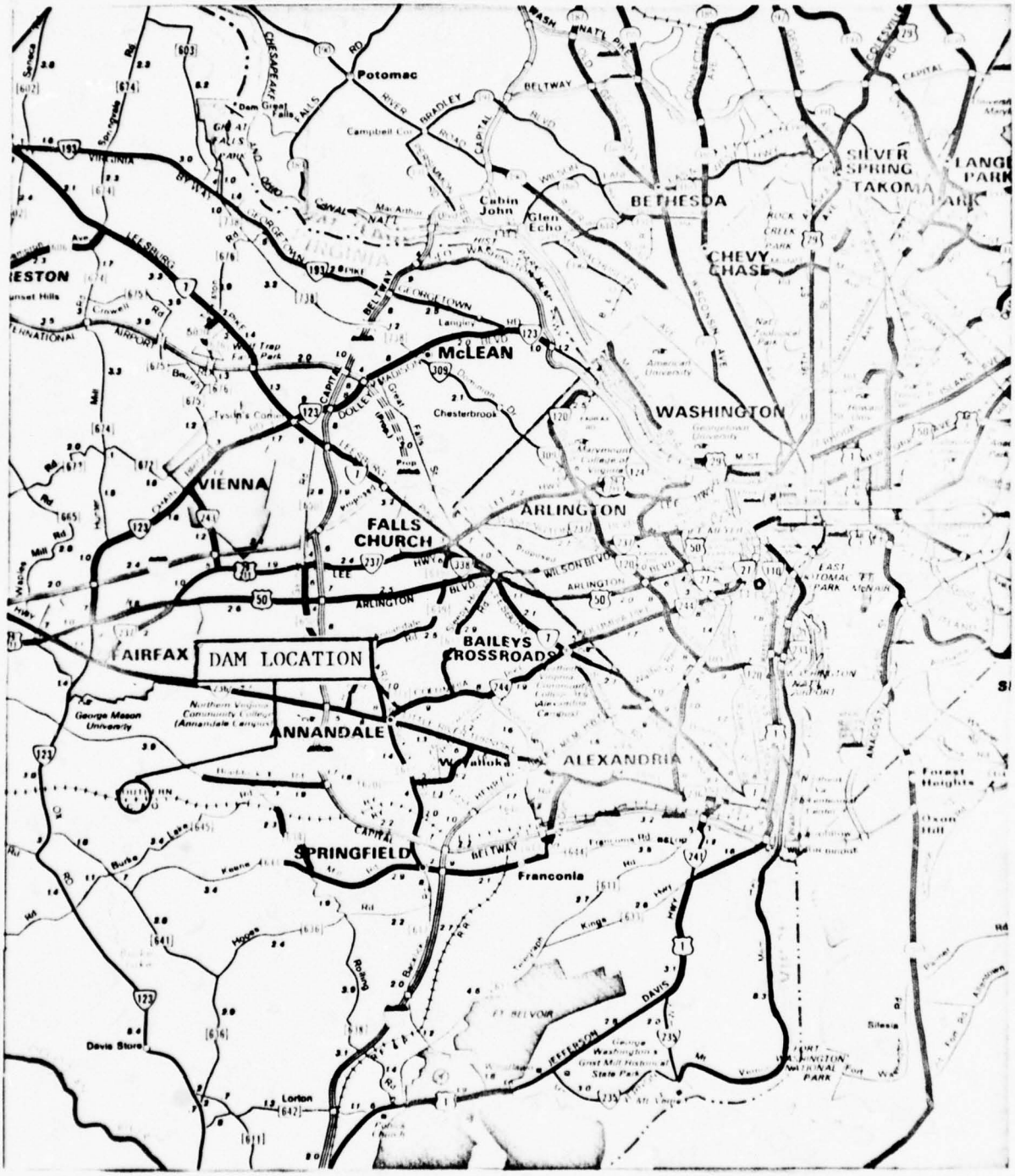
2) The following repair items should be completed as part of the annual maintenance of the dam:

   a) Correct erosion on the left bank of the reservoir, about 50 feet from the end of the left junction of embankment and abutment.

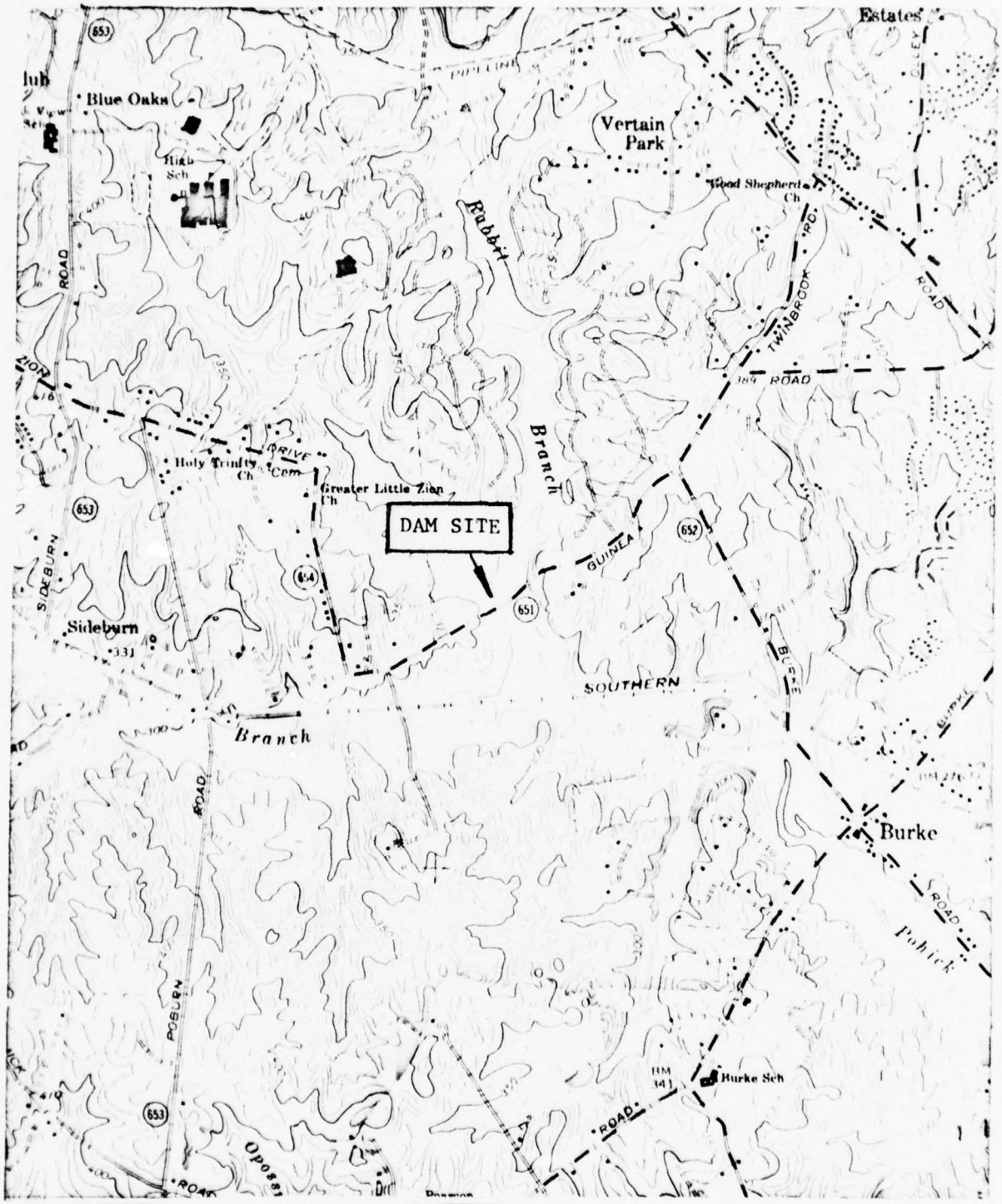
   b) Correct erosion in the vicinity of the toe drain at the left end of the dam.

APPENDIX I

MAPS AND DRAWINGS



REGIONAL MAP
POHICK CREEK DAM SITE # 4



MN GN

1° 1°27'
1.24 MILS 26 MILS

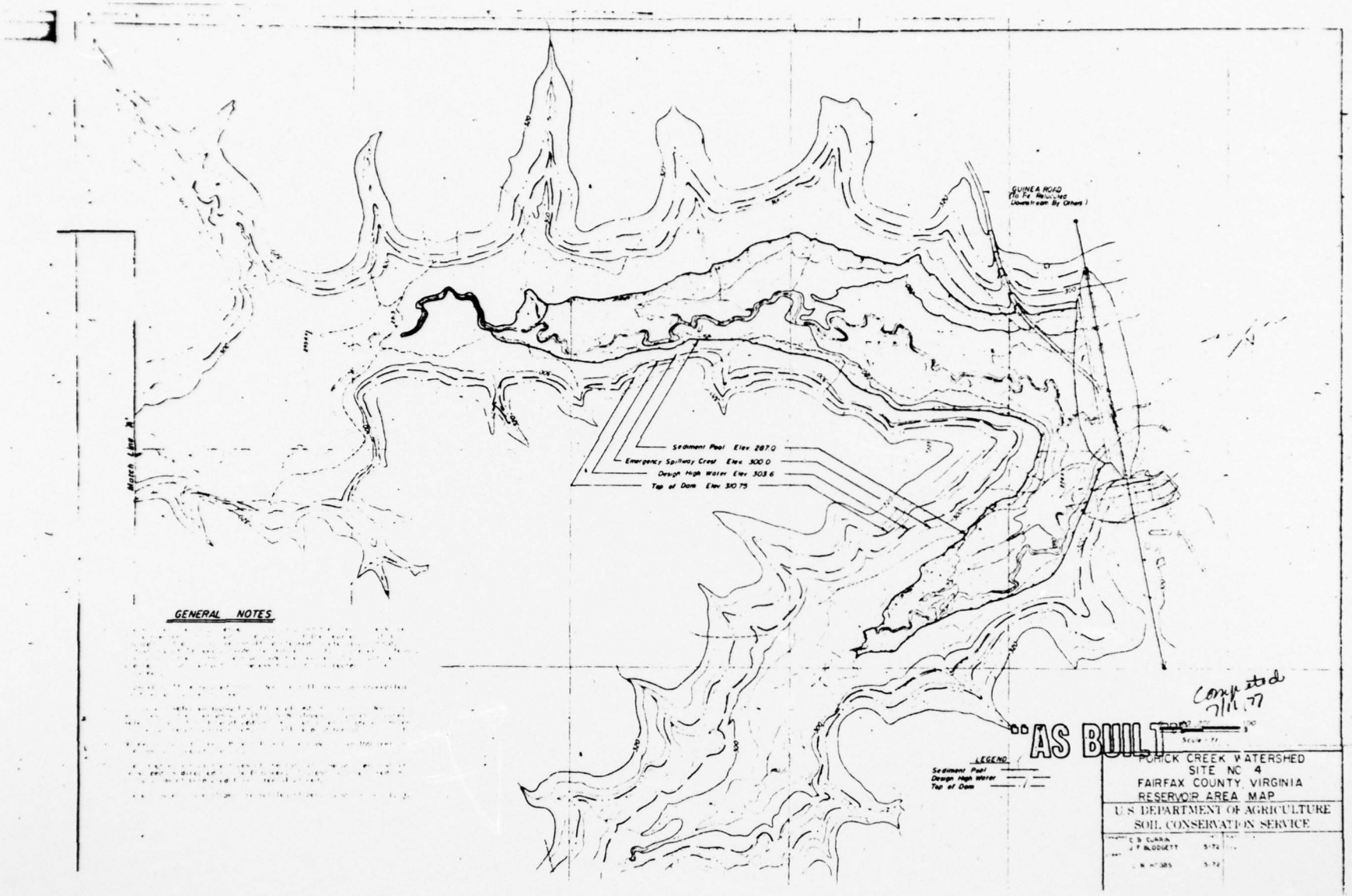
TM GRID AND 1971 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

FAIRFAX, VA.
N3845—W7715/7.5

1966
PHOTOREVISED 1971
AMS 5561 IV SE—SERIES V834

Scale: 1" = 2000'
10' Contours

VICINITY MAP
POHICK CREEK DAM SITE # 4



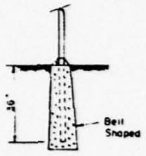
GENERAL NOTES

POHICK CREEK WATERSHED
SITE NO 4
FAIRFAX COUNTY, VIRGINIA
RESERVOIR AREA MAP
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

E.B. CLARK
J.F. BLODGETT 5-72
N.H. 5-72

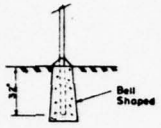
CHAIN LINK FENCE

ITEM	SIZE
Terminal Posts	2 1/2" ϕ
End Posts	2 1/2" ϕ
Line Posts	2 " ϕ
Top And Bottom Rail	1 5/8" ϕ
Rail Sleeve	2"
96" Chain Link Fence With 2" Mesh	
Tie Wires	As Per Manufacturers Recommendations
Rail End Bands	
Tension Bands	
Tension Bars	
Rail End Fittings	
Bottom Rail Line Post Connector	
Brace Rail Bands	
Truss Rods	
Brace Rail	



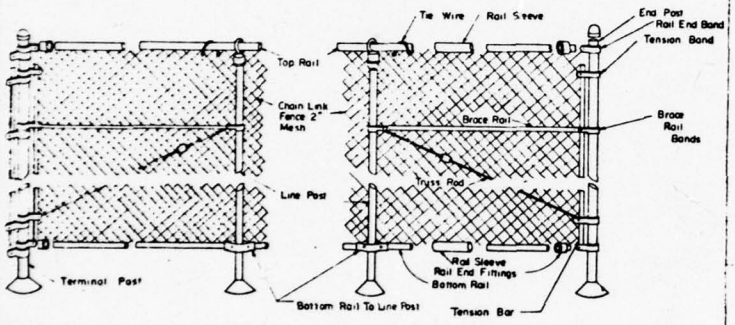
TERMINAL & END POST DETAIL
Not To Scale

Terminal, Corner & Gate Post Holes - 12" Min. Dia. At Top By 48" Deep Post Set At Fill 36" Into Hole

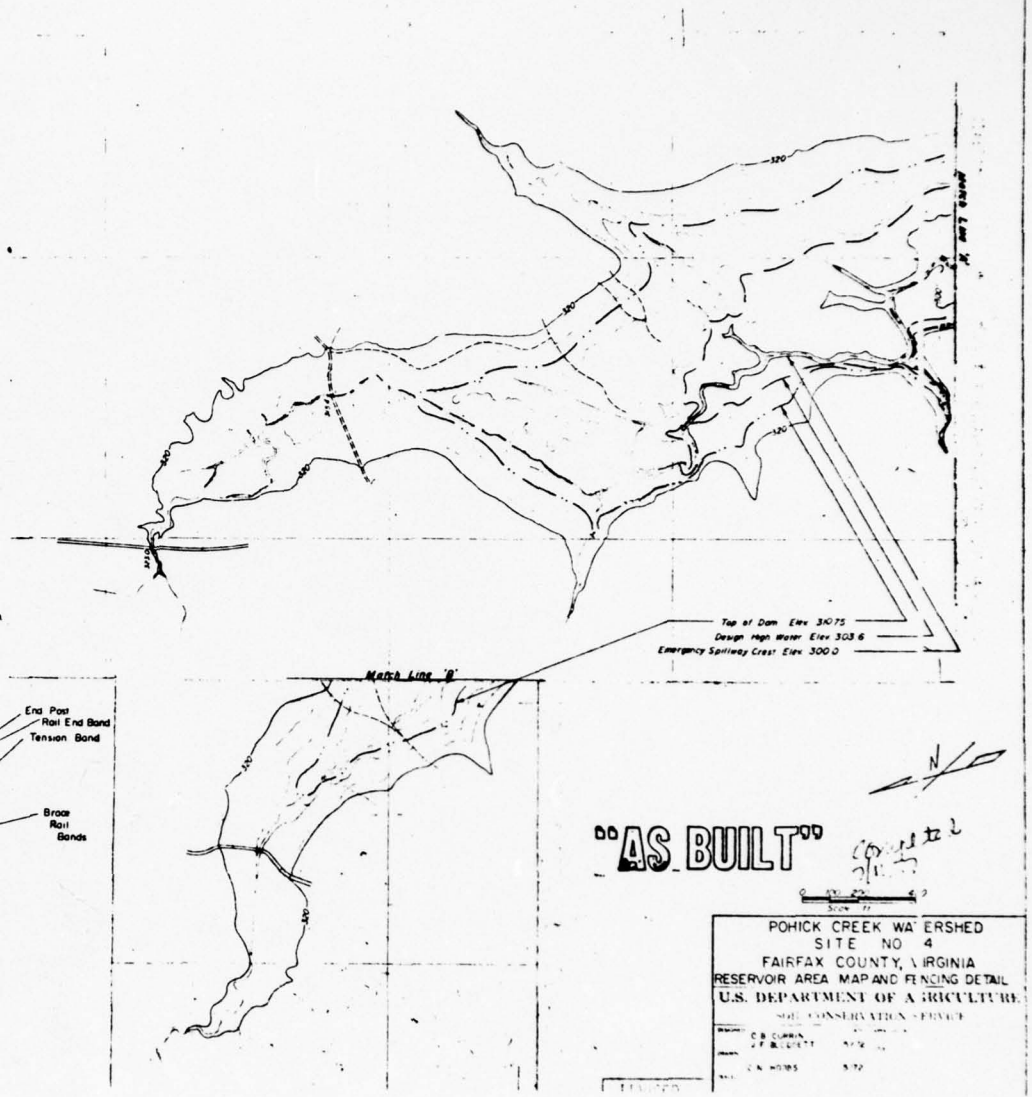


LINE POST DETAIL

Line Post Holes - 8" Min. Dia. At Top By 36" Deep Posts Set At Fill 32" Into Hole

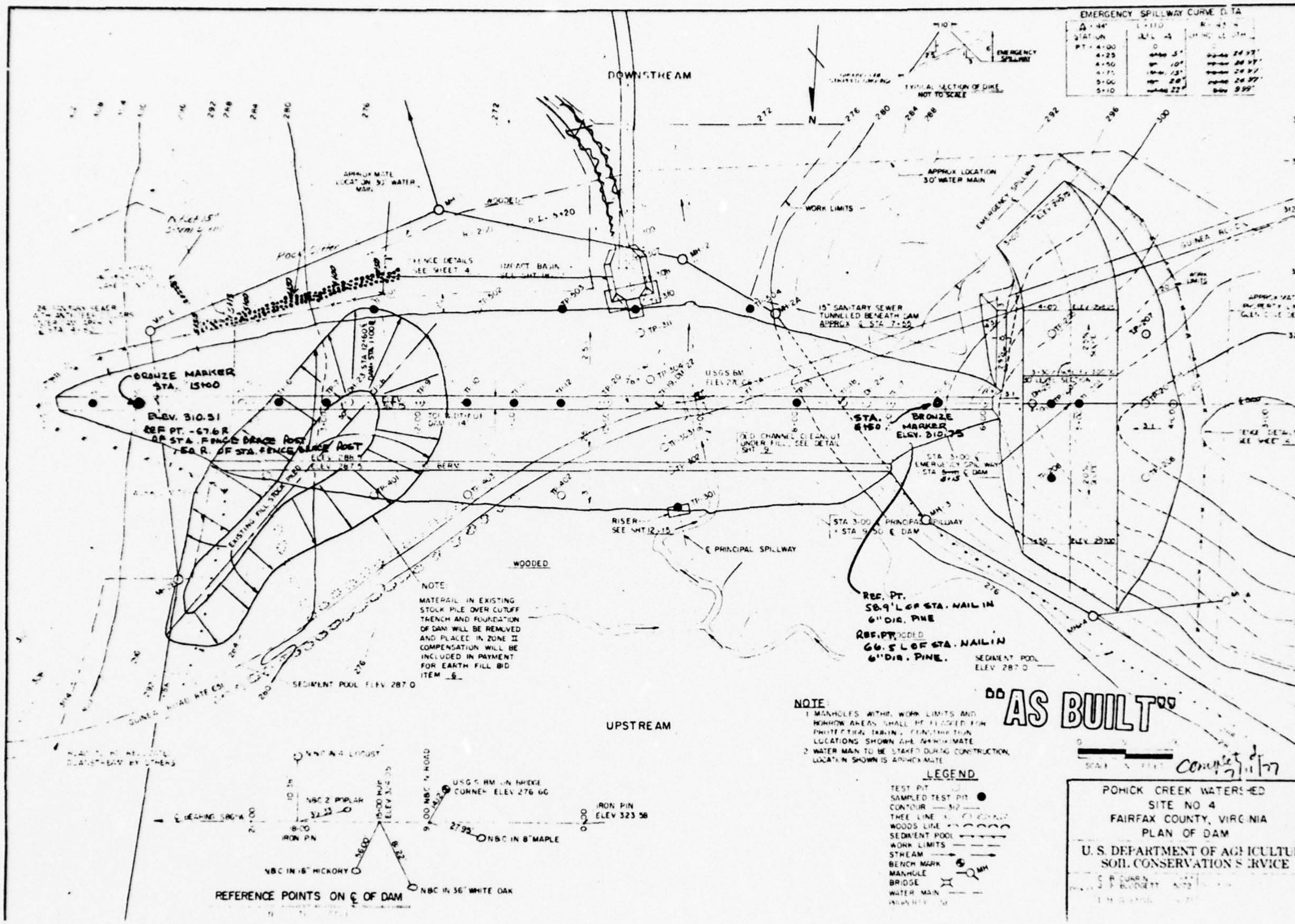


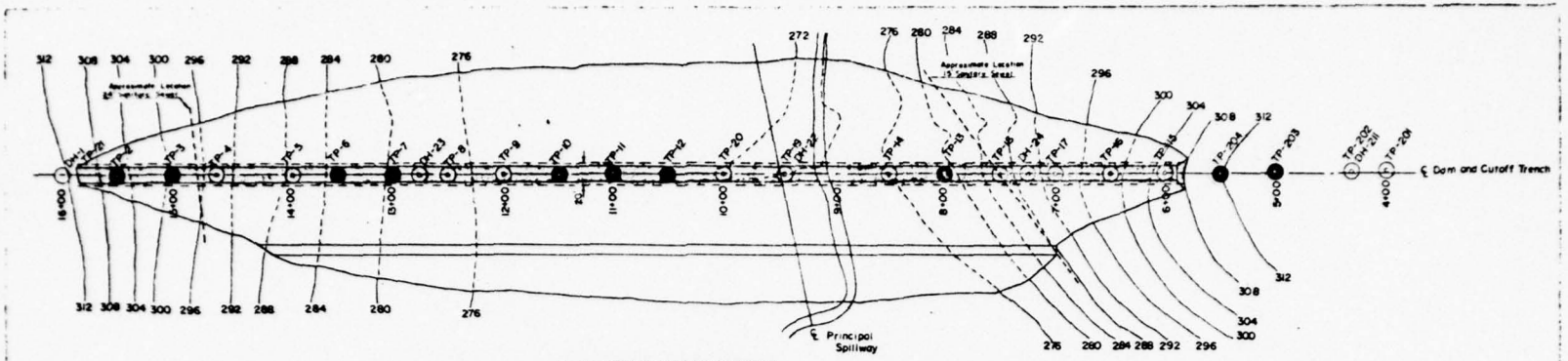
CHAIN LINK FENCE DETAILS
NOT TO SCALE



"AS BUILT"

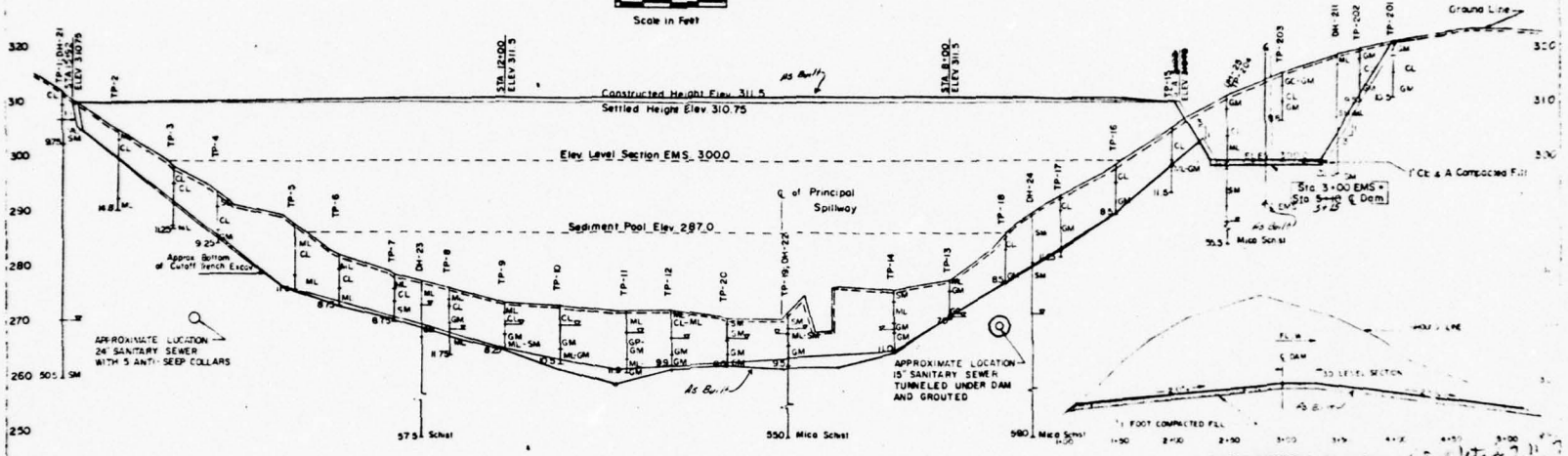
POHICK CREEK WATERSHED
SITE NO 4
FAIRFAX COUNTY, VIRGINIA
RESERVOIR AREA MAP AND FENCING DETAIL
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

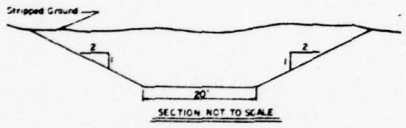

DOWNSTREAM
UPSTREAM
EMERGENCY SPILLWAY CURVE DATA
TYPICAL SECTION OF DIKE NOT TO SCALE
APPROX LOCATION 30" WATER MAIN
WORK LIMITS
15" SANITARY SEWER TUNNELED BENEATH DAM APPROX ℄ STA 7+55
FENCE DETAILS SEE SHEET 4
BRONZE MARKER STA. 15+00
ELEV. 310.51
USGS BM
OLD CHANNEL CLEANOUT UNDER FILL SEE DETAIL
STA. 6+50 BRONZE MARKER ELEV. 310.75
RISER SEE SHT 12, 15
℄ PRINCIPAL SPILLWAY
WOODED
NOTE
MATERAIL IN EXISTING STOCK PILE OVER CUTOFF TRENCH AND FOUNDATION OF DAM WILL BE REMOVED AND PLACED IN ZONE II COMPENSATION WILL BE INCLUDED IN PAYMENT FOR EARTH FILL BID ITEM 6
SEDIMENT POOL ELEV 287.0
REF. PT. 58.9' L OF STA. NAIL IN 6" DIA. PINE
REF. PT. 66.5' L OF STA. NAIL IN 6" DIA. PINE
"AS BUILT"
NOTE
1 MANHOLES WITHIN WORK LIMITS AND BORROW AREAS SHALL BE FLAGGED FOR PROTECTION DURING CONSTRUCTION LOCATIONS SHOWN ARE APPROXIMATE
2 WATER MAIN TO BE STAKED DURING CONSTRUCTION LOCATION SHOWN IS APPROXIMATE
LEGEND
TEST PIT
SAMPLED TEST PIT
CONTOUR
WOODS LINE
SEDIMENT POOL
WORK LIMITS
STREAM
BENCH MARK
MANHOLE
BRIDGE
WATER MAIN
USGS BM ON BRIDGE CORNER ELEV 276.60
IRON PIN ELEV 323.58
NBC IN 8" MAPLE
NBC IN 18" HICKORY
NBC IN 36" WHITE OAK
REFERENCE POINTS ON ℄ OF DAM
POHICK CREEK WATERSHED
SITE NO 4
FAIRFAX COUNTY, VIRGINIA
PLAN OF DAM
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



PLAN VIEW OF CUTOFF TRENCH

Scale in Feet





TYPICAL SECTION THROUGH CUTOFF TRENCH

PROFILE ALONG ℄ OF DAM AND CUTOFF TRENCH

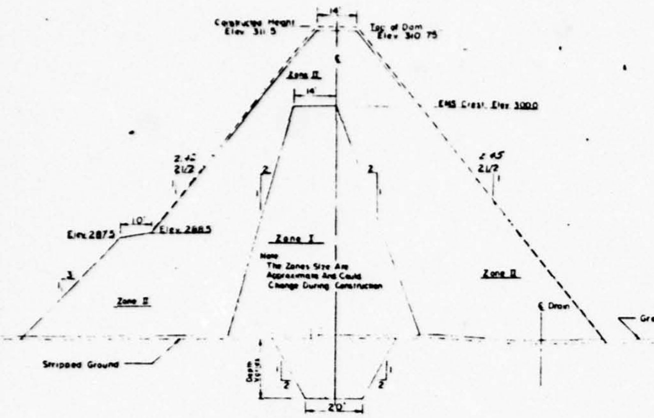
15+00 14+00 13+00 12+00 11+00 10+00 9+00 8+00 7+00 6+00

NOTE
1. THE EXCAVATION LIMITS SHOWN ARE APPROXIMATE AND WILL BE ADJUSTED IN ACCORDANCE WITH CONDITIONS ENCOUNTERED
2. THE WATER TABLE LEVELS INDICATED REFLECT CONDITIONS AT THE TIME OF INVESTIGATIONS

PROFILE EMERGENCY SPILLWAY

"AS BUILT"

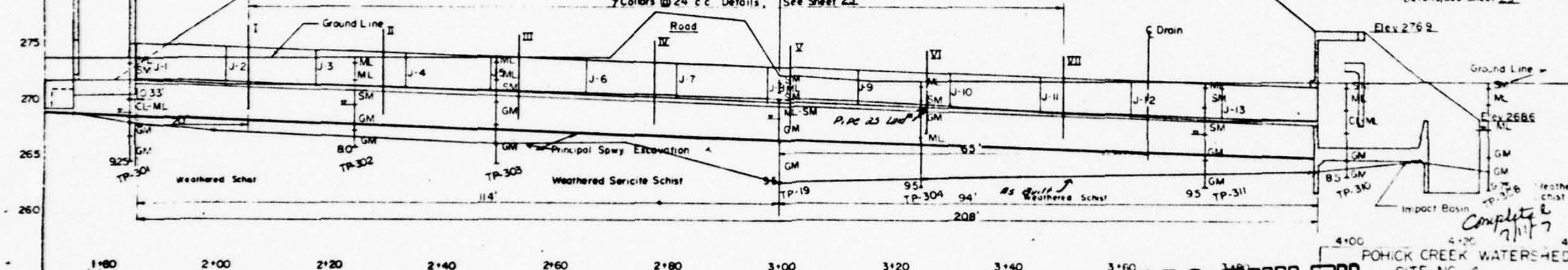
POHICK CREEK WATERSHED
SITE NO. 4
FAIRFAX COUNTY, VIRGINIA
CUTOFF TRENCH DETAILS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

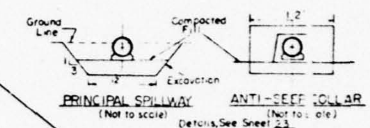


TYPICAL SECTION OF COMPACTED FILL
(Not To Scale)

Embankment Zone	Classification	Location	Average Depth (Ft.) From	To	Description	Class						Sample No. Field	Lab			
I	CL-ML	BORROW	1.0	2.0	Residual; Silt, clayey w/sand red, hard, moist	A	95	Opt	[illegible]	2620	[illegible]	[illegible]	259	107.0	[illegible]	
I	ML*	"	1.0	2.0	Colluvium; Silt, sandy w/[illegible] red-brown, firm, moist	A	95	Opt	[illegible]	2698	A	116-1	260	112.5	[illegible]	
I	ML*	"	1.0	4.25	Alluvium; Silt, light gray w/brown mottles, firm, moist	A	95	[illegible]	[illegible]	2655	A	121-1	262	[illegible]	[illegible]	
I	CL	EMS	2.5	7.5	Residual; Clay, silty red hard, moist	A	95	Opt	+3	2698	A	204-1	257	107.0	[illegible]	
II	GC-GM	BORROW	1.75	2.25	Terrace Alluvium; Gravel silty w/sand, hard, moist	C		*				117-1	[illegible]			
II	GC-GM	EMS	1.0	2.5	Terrace Alluvium; Gravel silty w/sand, stiff, moist	C		*				205-1	256			
II	GM	"	4.0	9.5	Residual; Gravel, silty w/sand red, hard, moist	C		*				206-1	255			

1/ Adjacent to structures, Max. rock size = 3"
2/ At time of placement.
3/ See sheet 25 for compaction curves and mass densities.
* Material classified CL by SML, Lucas

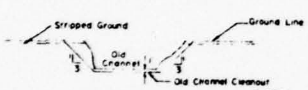




PROFILE OF PRINCIPAL SPILLWAY CENTERLINE

Scale — Feet
Vertical Scale

Scale — Feet
Horizontal Scale



TYPICAL SECTION
OLD CHANNEL CLEANOUT

NOTE
OLD CHANNEL CLEANOUT, EXCAVATION COMMON, IS TO BE PERFORMED PRIOR TO PLACING COMPACTED FILL

NOTE
1. THE EXCAVATION LIMITS SHOWN ARE APPROXIMATE AND MAY BE ADJUSTED

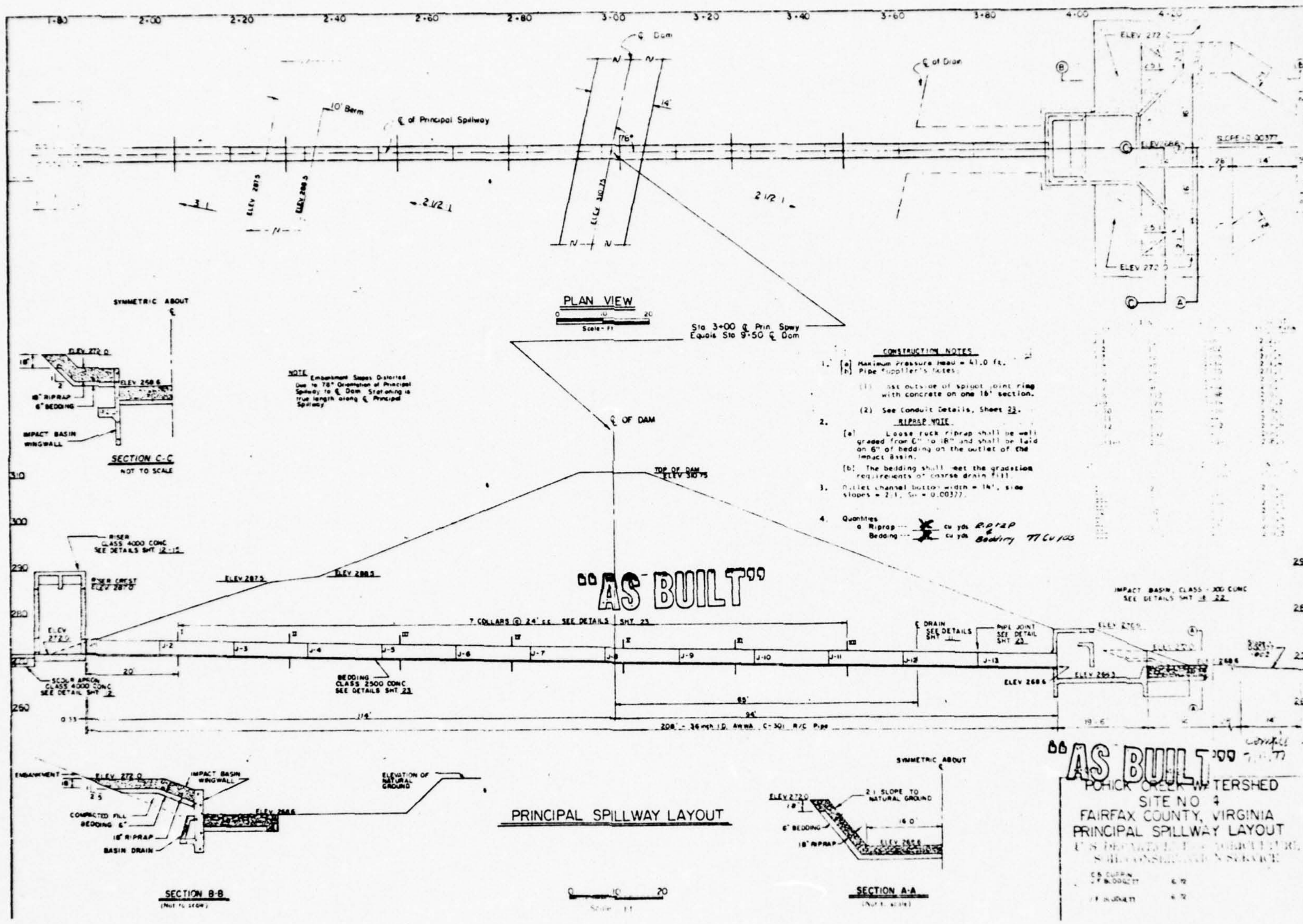
"AS BUILT"

Complete 7/1/77

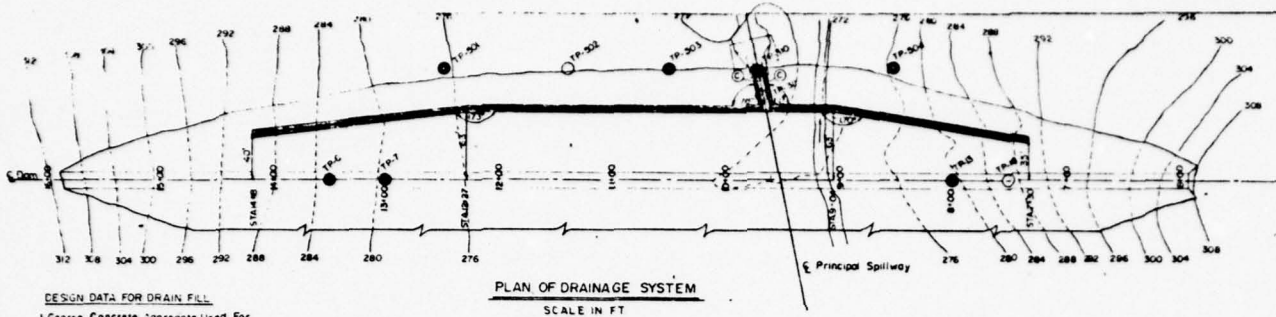
POHICK CREEK WATERSHED
SITE NO. 4
FAIRFAX COUNTY VIRGINIA
SPILLWAY EXCAVATION & FILL PLACEMENT

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

C.B. GIBBN
J.P. BLODGETT 5/72


PLAN VIEW
Sta 3+00 ℄ Prin. Spwy
Equals Sta 9+50 ℄ Dam
℄ Dam
℄ of Principal Spillway
10' Berm
℄ of Drain
ELEV 287.5
ELEV 288.5
ELEV 310.75
ELEV 272.0
ELEV 268.6
SLOPE 0.00377
NOTE Embankment Slopes Distorted Due to 76° Orientation of Principal Spillway to ℄ Dam. Stationing is true length along ℄ Principal Spillway
CONSTRUCTION NOTES
1. [a] Maximum Pressure Head = 41.0 ft.
[b] Pipe Supplier's Notes:
(1) ... outside of spigot joint ring with concrete on one 16' section.
(2) See Conduit Details, Sheet 23.
2. RIPRAP NOTE
[a] Loose rock riprap shall be well graded from 6" to 18" and shall be laid on 6" of bedding on the outlet of the Impact Basin.
[b] The bedding shall meet the gradation requirements of coarse drain fill.
3. Outlet channel bottom width = 14', side slopes = 2:1, So = 0.00377.
4. Quantities
a Riprap --- cu yds
Bedding --- cu yds
Riprap & Bedding 77 Cu yds
℄ OF DAM
TOP OF DAM ELEV 310.75
RISER CLASS 4000 CONC SEE DETAILS SHT 12-15
RISER CREST ELEV 287.0
SCOUR APRON CLASS 4000 CONC SEE DETAIL SHT 12
7 COLLARS @ 24' c.c. SEE DETAILS SHT 23
BEDDING CLASS 2500 CONC SEE DETAILS SHT 23
℄ DRAIN SEE DETAILS SHT
PIPE JOINT SEE DETAIL SHT 23
IMPACT BASIN, CLASS 3000 CONC SEE DETAILS SHT 18-22
ELEV 268.6
208' - 36 inch I.D. AWWA C-301 R/C Pipe
"AS BUILT"
SECTION C-C
NOT TO SCALE
SYMMETRIC ABOUT ℄
18" RIPRAP
6" BEDDING
IMPACT BASIN WINGWALL
SECTION B-B
EMBANKMENT
COMPACTED FILL
BEDDING 6"
18" RIPRAP
BASIN DRAIN
ELEVATION OF NATURAL GROUND
PRINCIPAL SPILLWAY LAYOUT
SECTION A-A
2:1 SLOPE TO NATURAL GROUND
ELEV 265.8
POHICK CREEK WATERSHED
SITE NO 4
FAIRFAX COUNTY, VIRGINIA
PRINCIPAL SPILLWAY LAYOUT

30



PLAN OF DRAINAGE SYSTEM

SCALE IN FT
0 5 25 50 75 100

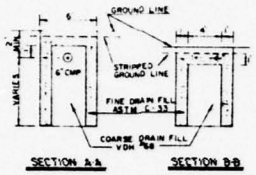
DESIGN DATA FOR DRAIN FILL

1 Coarse Concrete Aggregate Used For Coarse Drain Fill, Department Of highways, Virginia Size # 68

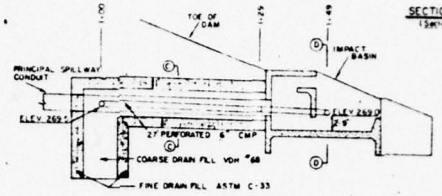
Sieve #	% Passing
1"	Min 100
3/4"	90 — 100
3/8"	31 — 65
#4	0 — 20
#8	0 — 8
#16	0 — 3

2 Fine Concrete Aggregate used For Fine Drain Fill, ASTM C-33

Sieve #	% Passing
3/8"	Min 100
#4	95 — 100
#8	80 — 100
#16	50 — 85
#30	25 — 60
#50	10 — 30
#100	2 — 10

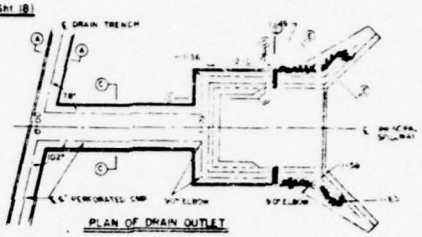


SECTION A-A SECTION B-B

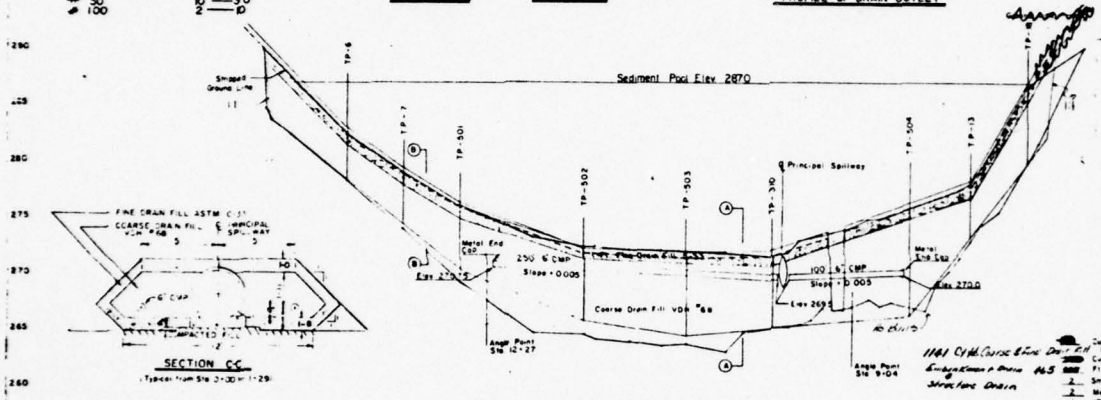


PROFILE OF DRAIN OUTLET

SECTION E-E (See Sht 18)
(Sections not to Scale)



PLAN OF DRAIN OUTLET



PROFILE ALONG ℄ OF DRAIN
(Stationing is True Length along ℄ Drain)

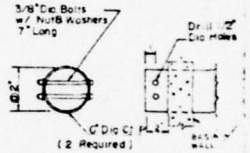
SECTION C-C
(Typical from Sta 3+30 to 1+29)

CONSTRUCTION DETAILS

1 All Drain Pipe Shall Conform to Spec 551 And Shall All Be, 18 Gauge, Shape 1, Class II, Perforated

2. The Excavation Limits Are Approximate And will Be Adjusted In Accordance With Conditions Encountered

"AS BUILT"



SMALL ANIMAL GUARD DETAILS

Completed 7/11/77

QUANTITIES

	Cu Yds Fine Drain Fill (ASTM C-33 Fine Concrete Aggregate)
	Cu Yds Coarse Drain Fill (VDH Size 68)
	Ft 6" Corrugated Metal Pipe, Perforated
1	Small Animal Guards
1	Metal End Caps
	170° Elbow
	102° Elbow
	78° Elbow
6	90° Elbow

POHICK CREEK WATERSHED
SITE NO 4
FAIRFAX COUNTY, VIRGINIA
DRAINAGE DETAILS

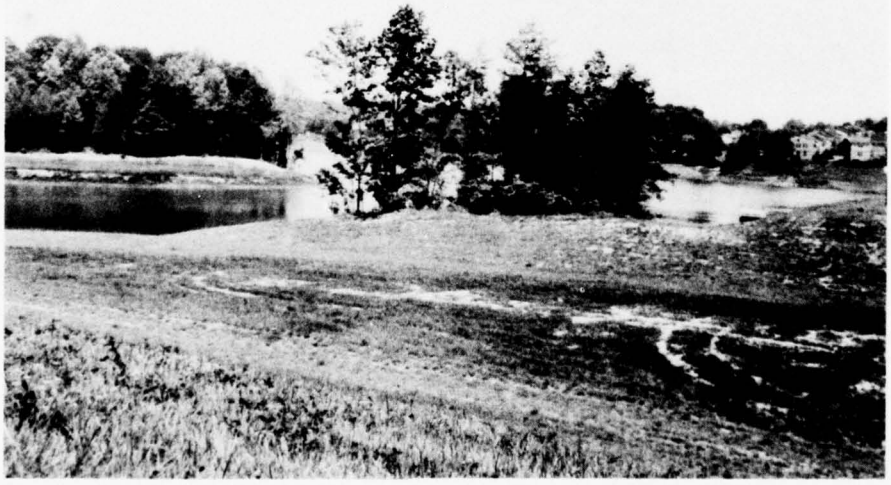
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

S P McCARTY 6/72
J F BURNETT 6/72

APPENDIX II

PHOTOGRAPHS

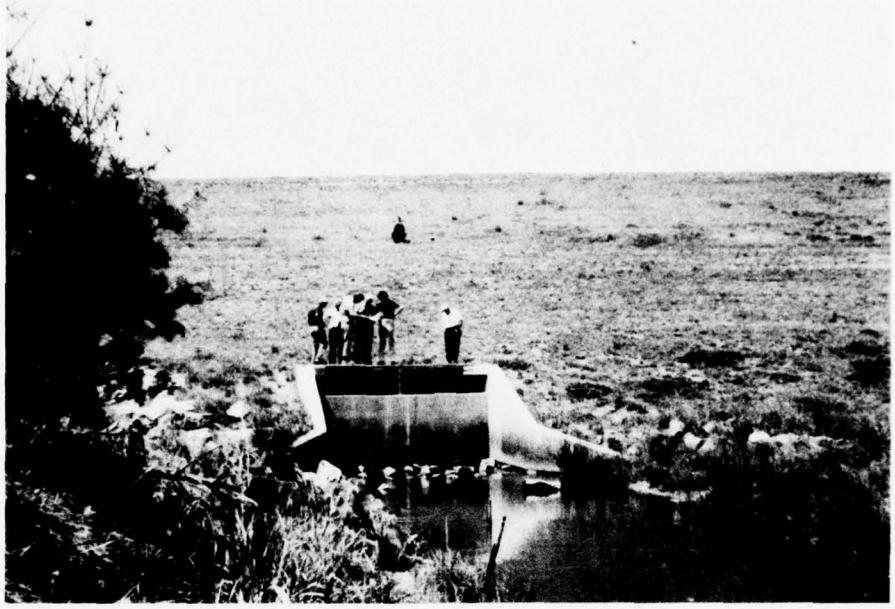
PHOTOGRAPH NO. 1
Upstream Face of Dam and Principal Spillway Intake Structure



PHOTOGRAPH NO. 2
Emergency Spillway Channel

PHOTOGRAPH NO. 3
Emergency Spillway Outlet

PHOTOGRAPH NO. 4
New Construction Site Adjacent to Emergency Spillway



PHOTOGRAPH NO. 5
Principal Spillway Outlet Structure

PHOTOGRAPH NO. 6
Downstream

APPENDIX III

FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Pohick Creek Dam
Site # 4 (PL55G Dam # 4)

County Fairfax

State Virginia

Coordinates 3848.0 Lat.
7717.5 Long.

Date(s) Inspection 5/30/79

Weather Clear

Temperature 80° F

Pool Elevation at Time of Inspection 287 M.S.L.

Tailwater at Time of Inspection 268.8 M.S.L.

Inspection Personnel:

John Jones, Law Engineering Assoc.

John Koenig , Director of Public Works

Dr. Pat Bartz, N. VA SWCB

Hugh Gildea, SWCB

Harold Williamson, Dept. Director

Puller A. Hughes, Jr., USSCS, District Conservationist, Fairfax Co.

Bob Royce, Fairfax Co. Parks Dept.

Bob Kiser, Fairfax Co. Ass't Supervisor of Construction & Maintenance Fairfax County

Chris Giese, Law Engineering Associates

Tan C. Young, DMM&A

Paul Seiler, DMM&A Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	No visible cracks.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	No cracking or movement at toe.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No sloughing visible. Surface erosion at abutment.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No visible misalignment of crest.	
RIPRAP FAILURES	None visible. Very little riprap used at pool elevation alone embankment. No erosion noticeable.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONSTRUCTION MATERIAL	Earth - see design calculations, Appendix IV.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No visible cracks.	Emergency spillway 50 '± right of right abutment.
ANY NOTICEABLE SEEPAGE	No visible seepage	
STAFF GAGE AND RECORDER	None at site.	
DRAINS	Outlet drain at w.w. outlet structure. Right drain operating Left drain not operating.	
FOUNDATION	See plans. Cut off trench 10 feet deep (appendix I)	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None visible.	
INTAKE STRUCTURE	In lake - Owner & SCS representatives indicated valve is operable. No obvious failures.	
OUTLET STRUCTURE	No visible cracking or failure of structure.	
OUTLET CHANNEL	Channel is about 20 feet wide.	
EMERGENCY GATE		

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	No failures indicated by SCS & Owner.	
APPROACH CHANNEL	Forested slopes at 4% ±.	
DISCHARGE CHANNEL	About 20 ' wide, 3 ' high banks.	
BRIDGE AND PIERS		

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS		
OBSERVATION WELLS	None.	
WIERS	None.	
PIEZOMETERS	None.	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Forested, about 3-4 % slopes.	
SEDIMENTATION	Unknown.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No obstructions.	
SLOPES	Low banks, slopes 1-1/2:1 Channel 18± feet wide.	
APPROXIMATE NO. OF HOMES AND POPULATION	20± near the left abutment, estimated population is 60. 10± below the emergency spillway, estimated population is 30.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	See Appendix II
REGIONAL VICINITY MAP	See Appendix I
CONSTRUCTION HISTORY	The dam was built in 1971
TYPICAL SECTIONS OF DAM	2.5(H) : 1(V) on downstream slope 2.5(H) : 1(V) upper part of upstream slope 3(H) : 1(V) lower part of upstream slope — See Appendix II
HYDROLOGIC/HYDRAULIC DATA	
OUTLETS - PLAN and - DETAILS	See Appendix II
- CONSTRAINTS and - DISCHARGE RATINGS	
RAINFALL/RESERVOIR RECORDS	

ITEM	REMARKS
DESIGN REPORTS	None
GEOLOGY REPORTS	SCS Design - Regional SCS office
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	SCS Design - Regional office has design.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	SCS design borings - Regional office.
POST-CONSTRUCTION SURVEYS OF DAM	Inspections in October of each year.
BORROW SOURCES	

ITEM	REMARKS
MONITORING SYSTEMS	
MODIFICATIONS	
HIGH POOL RECORDS	Have not experienced any high records to date.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OF FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	Owner has check-off list for inspections done each October.

ITEM	REMARKS
SPILLWAY PLAN	See Appendix II
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	

APPENDIX IV

GEOLOGIC REPORT AND

OPERATION AND MAINTENANCE PLAN

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

GENERAL

State Virginia County Fairfax ___ ¼, ___ ¼, Sec ___, T ___ R ___ ; Watershed Pohick Creek

Subwatershed Rabbit Branch Fund class ___ (FP 2, WP 1, etc.) Site number 4 Site group 1 Structure class C

Investigated by [signature] Geologist (signature and title) Equipment used Truck-mounted Acker core drill & Skic-type drill (Sprague & Henwood) (type, size, make, model, etc.) Date 5/72

SITE DATA

Drainage area size 3.8 sq. mi. 2432 acres. Type of structure Earth Fill Purpose Flood Prevention

Direction of valley trend (downstream) South Maximum height of fill 38.5 feet. Length of fill 1020 feet

Estimated volume of compacted fill required 101,319 yards

STORAGE ALLOCATION

	Volume (ac. ft.)	Surface Area (acres)	Depth at Dam (feet)
Sediment	258	38	15.5
Floodwater	839	89	28.5

SURFACE GEOLOGY AND PHYSIOGRAPHY

Physiographic description Piedmont Topography Gentle to steep Attitude of beds Dip 45° NW to 90° Strike N 20° E

Steepness of abutments: Left 9 percent; Right 13 percent. Width of floodplain at centerline of dam 350 feet

General geology of site:

(Note: This report is supplementary to the original backhoe investigation of 5/70. The reader is referred to the original report, logs, and SCS-35's for information on soils other than that disclosed by the added drill holes).

Pohick Creek Site #4 lies on Rabbit Branch, a northern tributary of Pohick Creek, in the upper part of the watershed. The site is near the Southern Railway, two miles east of Fairfax Station and three miles SSE of Fairfax Court House.

Quartz-mica-chlorite schist of the Wissahickon Formation underlies this site. Some quartzite beds are found. The foliation of the

rocks dips from 60° to vertically. The strike makes an angle of about 70° with the centerline of the dam.

Centerline of the Dam

The centerline of the dam lies across a moderately wide floodplain between gentle abutments. On the left abutment, the schist is very deeply weathered. Three feet of red silty clay overlie fine micaceous silty sand which is a weathering product of mica schist. Auger penetration was made to 50.5 feet (DH 21, 16+00) without rock being encountered. This varies considerably from the previous investigation of 5/70 in which a backhoe encountered refusal in this same location at 9.75 feet.

Blow counts varied from 10-94 blows/foot. (The micaceous sand was generally quite hard). Permeability rates varied from 0-1.1 feet/day, with most values below 0.6.

Lower on the left abutment (12+75), mica schist lay 22.3 feet below ground (auger refusal). Olive-brown micaceous silty sand 15.3 feet thick overlies the schist and is similar in nature to that described in DH-21. Over this saprolitic sand lies five feet of red silty sand and two feet of brown sandy silt. The schist itself was weathered olive-brown throughout (to 57.5 feet), and was badly jointed. The joints mostly dipped 45-60° opposite the dip of the foliation. The joints had a black manganese stain (wad). Occasional granitic or pegmatite veins occur.

Blow counts ranged from 6-73 blows/foot, the values increasing downward. Permeability rates varied from 0-59 feet/day in soil, increasing to a maximum just above rock. In rock, rates were 0-12.2 feet/day; most values were below 2.0 feet/day. Pressure tests gave rates of .1-4.5 feet/day, most values being below 2.0. Above 32.5 feet, the rock was too broken to test.

In the floodplain (Sta. 9+50), alluvial silt, sand, and quartz gravel, 10 feet thick, overlie quartz-mica-chlorite schist. The rock is badly jointed along the foliation, here 60° NW, and also along a 45° direction opposite in dip to the foliation. A vertical fracture extends from 20.0-40.0; pressure-testing above 40.0 was precluded because water bypassed the packer through it. The schist is weathered greenish-gray to 20.0 and is an unweathered light gray below this.

Blow counts varied from 2-22 blows/foot. Permeability in soil was 0. In rock, permeability varied from 0-3.7 feet/day with most values at 0. Pressure tests gave values of 0-.1 foot/day. The ℄ pipe crosses at this station.

In the right abutment, mica schist lies 25.0-25.5 feet below ground. This contrasts with 7.0-11.5 feet for backhoe refusal. Micaceous silty sand 11.0-16.5 feet thick overlies the schist from which it is weathered. Over the schistose SM in the lower part of the abutment lies nine feet of fine red silty sand. In the upper right abutment, 10.5 feet of red clayey silt, then 3.5 feet of brown sandy silt overlie the micaceous sand. The schist is weathered olive-brown to a depth of 45 to 48 feet and is badly jointed along the foliation and opposite it. In the lower right abutment the schist grades into quartzite below 45.0.

Blow counts ranged from 10 to more than 100 blows/foot. Permeability rates in soil were from 0-17.5 feet/day with most values below 3.0. Pressure tests in rock gave .2-5.2 feet/day with most values below 3.0.

Emergency Spillway

One drill hole was made in the outside edge of the emergency spillway (Sta. 4+30 ℄ dam). The hole penetrated 2.0 feet of brown sandy silt, then 9.5 feet of fine red silty sand with silt lenses, then 11 feet of micaceous brown silty sand. No rock was encountered here to at least 22 feet (1 3/4 feet below spillway grade).

For soils information elsewhere in the emergency spillway, along the ℄ pipe, and in the borrow area, see the original report, logs, and the SCS-35's of May 1970.

Methods and Procedures

1. All soil boring was done with either an Acker truck-mounted auger or a Sprague & Henwood skid-type drill using a roller bit. The hole diameter was NX. Split spoon samples were taken every five feet, and the blows were recorded for each half-foot of a foot interval.

2. All rock coring was done with an NX core barrel (diamond bit) on either a truck-mounted or skid-type drill. Runs were made usually five feet in length. Recovery is expressed in percent of run length. Rock quality designation (RQD) is the percent of the run length made up of core pieces four inches or longer.

3. Permeability tests were taken usually in five-foot intervals. Permeability in feet per day is computed by the formula $K=Cp\ Q/h$, where K = permeability, feet/day; Cp is the proportionality constant for a test section of given length and width, Q is gallons/minute, and h is the head. This last quantity is the distance from the top of water in the hole to the center of the test section for depths above the water table, and the distance to the water table for depths below it. For uncased depths, Q for each succeeding test section is found by subtracting the previous gpm reading from the new one.

4. Pressure-testing was done with a five-foot long mechanical double-packer tester. The same formula for determining the k-factor is used as in the permeability tests, except the applied pressure in psi is converted to feet of water and added to the h-factor.

5. All cores were photographed on color slides. This was to preserve a record of the original nature of the rock in case the cores were destroyed or lost.

DETAILED GEOLOGIC INVESTIGATION OF SITE

GENERAL

State Virginia County Fairfax , Watershed Pohick Creek

Subwatershed Rabbit Branch Hydrologic unit code _____ Site number 4 Date 1 Structure class C

Investigated by Geologist Equipment used Front end loader and Massey Ferguson backhoe Date 5/79

(signature and title)

SITE DATA

Drainage area size 3.8 sq mi 2432 acres Type of structure Earth Fill Purpose Flood Prevention

Direction of valley trend (downstream) South Maximum height of fill 38.5 feet Length of dam 1020 feet

Estimated volume of compacted fill required 101,319 yd³

STORAGE ALLOCATION

	Volume (ac ft)	Surface Area (acres)	Depth at Dam (feet)
Sediment	258	38	15.5
Floodwater	839	99	28.5

SURFACE GEOLOGY AND PHYSIOGRAPHY

Physiographic description Piedmont Topography Gently rolling to moderately steep Attitude of beds (foliation) Dip 60° NW Strike N 45° E

Steepness of abutments: Left 9 percent, Right 13 percent Width of floodplain at centerline of dam 350 feet

General geology of site: Pohick Creek site No. 4 is located in the Piedmont physiographic province 2.5 miles south of Fairfax, Virginia. The site lies on Rabbit Branch, a northern tributary of Pohick Creek.

Quartz-muscovite (sericite) schist, locally chloritic, underlies this site. The rock exhibits foliation which generally strikes northeasterly and dips 60° northwest. This foliation is best displayed where biotite flakes or iron and manganese oxides are present in the schist. A deep C-horizon has formed from the schist. It consists of yellow to brown, olive-brown, or greenish sandy silt to silty gravel. On the abutments, a red B-horizon made up of yellow-red silty clay or clayey silt overlies the C-horizon. In places, above the B-horizon, colluvium or terrace

Clayey silt is found, as yellow-brown to brown clayey to sandy silt with subangular to subrounded quartz cobbles.

Floodplain materials include red-brown sandy silt to silty sand, gray and brown-mottled sandy silt, and quartz pebble and cobble gravel. These materials overlie weathered schist as do the other soils.

The stream pattern is dendritic.

Methods and Procedures

1. All soils were classified according to the U.S.C.S. System. The U.S.D.A. System was used in correlation of borrow material.

2. Test pits were dug with a backhoe; supplementary hand-auger holes were made in the borrow area.

Centerline of the Dam

The centerline of the dam is located across a moderately wide floodplain between a gentle left abutment and a steeper right one. Deeply weathered, fine-grained quartz-muscovite schist, sometimes bordering on phyllite, underlies the floodplain and abutments. Residual soil, with a partial overlay of colluvium, extends from the top of the dam (Sta. 15+88) to Station 12+00, on the left abutment. The top residual layer is a silty clay, 1.5-12.5 feet thick, red to yellow-red in the upslope part and becoming red with brown mottles downslope (below 15+00). Occasional angular quartz cobbles, derived from weathering of quartz veins, occur in the clay. The CL is partly colluvial in nature, as between 13+50 and 15+50; and from 12+00 to 13+00. Above the red clay, from 15+50 to 14+75 and from 13+75 to the toe of the abutment is a brown to yellow-brown colluvial clayey silt with subangular quartz cobbles in some areas. This layer is 2-3 feet thick. Below the red CL, a C-horizon of micaceous sandy silt, 1-7 feet thick, grades downward into hard, weathered schist (Wissahickon formation), in which backhoe refusal was made. Muscovite, biotite, quartz and feldspar make up this rock. The C-horizon weathered from the schist is yellow-red to yellow-white in color upslope from 13+75 ℄ dam, and olive-brown or brown downslope. The foliation of the schist is everywhere retained in the C-horizon.

At 14+25 a sewer line has been emplaced 18 feet below ground, and about 12 feet below the surface of weathered rock (C-horizon). The sewer trench has been backfilled with spoil as brown clayey and gravelly sand, extending from about 13+75 to 14+75 ℄ dam.

In the floodplain, three feet of clayey silt, light gray with red-brown mottles, forms the top alluvial stratum from 11+75 to 10+75. Toward the stream channel (9+10), this layer becomes sandy silt to silty sand.

red-brown silty sand, one foot thick, overlies this from 10+50 to stream channel. It is more recent stream overwash. Below the mottled ML-SM, gray-brown quartz pebble and cobble gravel 2-5 feet thick overlie weathered mica schist (ML-GM). Colluvium of the left abutment extends out over the alluvial quartz gravel from 12+75 to 11+75. Near the right edge of the floodplain, 2.5 feet of artificial fill (SM) for a road bed covers the alluvium. At the time of investigation, the water table varied from 3.5 to 7.75 feet below ground.

On the right abutment, residual red silty clay, 2-6 feet thick, covers red to yellow-red silty gravel weathered from mica schist. This C-horizon, 4.5 to 8.5 feet thick, is composed of 3-6" schist flags. From 4+00 to 5+75, brown silty gravel containing 70% angular to sub-rounded quartz pebbles, cobbles and boulders, overlies the red clay to a depth of 1-2 feet. This may be a high alluvial terrace deposit.

Depth to rock (backhoe refusal) varied from 7.0 to 15.0 feet along the centerline of the dam. Twenty test pits were dug along the centerline. They are numbered TP-1 to TP-20.

Principal Spillway

One pipe location was investigated. It crosses the centerline of the dam at 9+50 ℄ dam and 3+00 ℄ pipe. The two centerlines form a 78° angle. Alluvium similar to that along the ℄ dam underlies the pipe location. 1.5-2.5 feet of red-brown silty sand to sandy silt, soft to firm, overlie 1.0-2.5 feet of stiff, light gray silty sand with brown mottles. Below this, gray quartz pebble to boulder - bearing gravel, 3 feet thick, overlies weathered mica-chlorite schist. The schist weathers to a silty gravel, 1.5-4.5 feet in thickness, and varying in color from brown to gray-green. Around 4+50 and 5+00, ℄ pipe, refusal was made on large quartz boulders, probably derived from weathering of vein quartz enclosed in the schist. The rock line (backhoe refusal) varies from 263 feet elevation near the riser end to 267 feet near the downstream end. Eleven test pits, TP 301 to TP 311, were dug along the centerline of the pipe.

Foundation

Three test pits were dug in the upstream half of foundation area and four in the downstream toe. Soils encountered were usually similar to those described in the ℄ dam and ℄ pipe. In the right side of the toe drain downstream, four feet of red-brown colluvial GM material overlies alluvial silt and gravel. Red-brown ML overlies mottled ML on the upstream left. Elsewhere, the mottled alluvial sandy silt or silty sand is the top layer. Depth to rock varies from 8.5 to 11.75. The test pits in the foundation are numbered TP 401 to TP 403 and TP 501 to TP 504.

Emergency Spillway

In the emergency spillway, red clayey silt or silty clay 2.0-6.5 feet thick covers gravelly silt to silty gravel schist material. In the downstream part of the spillway, brown to yellow-brown sandy silt, 1.5 to 2.0 feet thick, covers the red CL-ML. Eight test pits were dug in the emergency spillway. They are TP 201 to TP 208.

Borrow Area

The borrow area includes alluvium along Rabbit Branch up to 2,200 feet upstream from the ℄ dam, and along a right-hand tributary, 1,400 feet upstream. Borrow also includes a colluvial-residual strip on lower hillslopes bordering the alluvium.

Alluvial borrow is similar to alluvium already described under ℄ dam and ℄ pipe except the top alluvial layer is red-brown clayey silt in some places. The water table is generally higher in the alluvial borrow than in the foundation of the dam, 0.75 - 5.0 feet below ground. Thickness of alluvium ranges from 3.0 to 7.5 feet. Underlying weathered schist (GM) is from 1.2 - 3.5 feet thick.

Residual borrow lies on lower valley slopes alongside and between the forks of Rabbit Branch. It consists of red silty clay or clayey silt, 1.7 to 3.25 feet thick, over silty gravel weathered from mica schist, 2 - 3 feet thick. On the hill between Rabbit Branch and its tributary, brown silty gravel containing subangular quartz pebbles, 1.5 - 1.75 feet thick, covers the red silty clay. This gravel may be high terrace alluvium similar to that in the emergency spillway. Colluvial red-brown clayey to sandy silt extends over alluvium in places at the toe of this ridge.

Alluvial borrow totals 220,000 cubic yards and residual colluvial borrow, including that in the emergency spillway, approximately 25,000 cubic yards. (See the correlation chart for breakdown of these materials.) Twenty one test pits were dug in the borrow area. They are numbered HA 101 - HA 105 and TP 106 to TP 121.

UNITED STATES DEPARTMENT OF AGRICULTURE

SUBJECT: ENG - Pohick Creek Watershed, Site #4 DATE: July 14, 1970

TO: Neil F. Bogner, Head, E&WP Unit
SCS, Upper Darby, Pa. 19082

Attached are one set of SCS-35's, one copy of the geologic report, and the logs of the test holes.

Originals and one copy of the SCS-35's, prints of the logs, and one copy of the geologic report are being mailed to Lorn P. Dunnigan.

The soil samples from this site have been mailed to the laboratory.

Acting
Tom F. McGourin
State Conservationist

Attachments

cc: Lorn P. Dunnigan

September 1, 1970

SUBJECT: Comments on Pohick Creek Watershed, Virginia -
Site No. 4 - Geology Report

TO: Jerry Oman

Maps, logs and geology report are pretty good.

I disagree with the geology report, interpretations and conclusions, item 2 - A clay cushion would more likely aggravate differential settlement than minimize it. I can't tell from the geology report just what elevation the principal spillway goes in at, but it appears that the quartz boulders (and maybe some bedrock) at the lower end of the pipe will have to go.

- Robert Boyce

Robert Boyce

[illegible] Creek W/S		Rabbit Branch		
SITE NO. 4	SITE GROUP	STRUCTURE CLASS C	INVESTIGATED BY / SIGNATURE OF GEOLOGIST	DATE

INTERPRETATIONS AND CONCLUSIONS

ENGINEER'S REPORT

1. Embankment

The proposed embankment has a maximum height of 38 feet with a top width of 14 feet, elevation 310.75. The proposed slopes are 2 1/2:1 over 3:1 upstream with a 10 foot water berm at elevation 287.5 and 2 1/2:1 downstream. The embankment is to be zoned to the extent necessary to place the more plastic materials in the core, and the coarse-grained borrow and weathered rock from the emergency spillway forming the outer shell.

2. Borrow Material

The backhoe investigation shows good borrow material. However, the borrow area may have to be extended upstream to insure sufficient borrow if the floodplain material is found to be too wet to be fully utilized. The excavated material from the emergency spillway will be used in the fill.

3. Cutoff Trench

Centerline of the cutoff is coincident with the centerline of dam, with a 20 foot bottom width. It doesn't appear to be feasible to take the cutoff trench depth to rock over the entire length of the dam. On the left abutment, depth of cutoff will be 5 to 8 feet, extending into the residual-colluvial GM material. Across the flood plain, cutoff depth should extend through the alluvium to weathered sericite schist, depths from 8 to 12 feet. On the right abutment, depths from 7 to 8 feet extending into the residual GM material. The highly permeable material at stations 7+00 and 13+00 is too deep to be removed by the cutoff trench excavation. The geologist was unable to make a pressure test, but believes the weathered schist will not carry appreciable amounts of seepage. The sewer lines on either abutment should be located and the fill material checked and possibly replaced with compacted core material.

4. Principal Spillway

The principal spillway consists of a 13-foot single-stage, open-top riser, and approximately 230 feet of 36-inch reinforced concrete conduit.

Riser crest elevation	---	287.0
Inlet elevation	---	274.0
Outlet elevation	---	272.5

The principal spillway trench will have a 12 foot bottom width and 3:1 side slopes. Trench depth will extend only deep enough to provide compacted fill for the anti-seep collars. Camber should be added to the conduit to allow for settlement of the approximately 10 feet of material between the conduit and non-compressible foundation.

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES VA

WATERSHED	SUBWATERSHED	COUNTY	STATE
Pohick Creek	Rabbit Branch	Fairfax	Virginia

SITE NO.	SITE GROUP	STRUCTURE CLASS	INVESTIGATED BY: (SIGNATURE OF GEOLOGIST)	DATE
4	1	c		5/72

FOR IN-SERVICE USE ONLY

INTERPRETATIONS AND CONCLUSIONS

1. Cutoff into fresh unweathered rock on this site is unfeasible owing to the depth involved. However, cutoff should be taken into firm weathered schist if possible. This will involve a core trench 10-30 feet deep, deeper somewhat than that indicated by backhoe.

2. Permeability rates in general are not excessive. On the left abutment, where no rock is present above 50.5 feet, cutoff can be bottomed in schist sand. Blow counts indicate a firm foundation here.

3. A toe drain should be installed, using quartz gravel from the alluvium on site.

4. No rock is expected in the emergency spillway. The micaceous SM in the spillway area, however, seems to be highly erosive and therefore spillway slopes should be made flatter.

5. All other recommendations remain the same as in the original report.

[illegible] Creek W/S	[illegible] Branch	Fairfax	[illegible]	
SITE NO. 4	SITE GROUP	STRUCTURE CLASS C	INVESTIGATED BY (SIGNATURE OF GEOLOGIST)	DATE 5-7-

INTERPRETATIONS AND CONCLUSIONS

5. Emergency Spillway

The geologist reports that all the excavated material will be suitable for use in the fill. The side slopes in the erodible CL material could be reduced to 4:1 to lower the erosion potential and provide additional embankment fill material.

6. Foundation Drain

A trench drain will be installed in the downstream toe, extending into the foundation well into the water-bearing GM layer. Depth should be approximately 7 feet below ground elevation across the flood plain. Without a positive cutoff, a highly permeable drain fill material and perforated drain pipe should be utilized.

SOIL SAMPLE LIST
SOIL AND FOUNDATION INVESTIGATIONS

Location Fairfax County, Va. Owner

Watershed Pohick Creek Sub-watershed Rabbit Branch Site No. 4

Submitted by J. W. Caffrey Date June 1970

Sent by Truck (carrier) Government B/L No.

Lab. No.	Field Sample No.	Sample Description		Depth		Type of Sample	
		Location	Grid or Station	From	To	Undist.	Dist.
	2-1	℄ Dam	15+50	1.8	12.5		x
	3-1	"	15+00	1.0	3.0		x
	6-1	"	13+50	1.0	1.75	x	
	7-1	"	13+00	5.0	8.75		x
	10-1	"	11+50	1.0	1.75	x	
	11-1	"	10+00	4.0	8.0		x
	12-1	"	10+50	1.0	5.0		x
	13-1	"	8+00	2.0	3.75		x
	111-1	Borrow Area		1.0	2.2		x
	114-1	"		1.0	2.0		x
	117-1	"		1.75	5.25		x
	121-1	"		1.0	4.25		x
	203-1	℄ Dam	5+00	1.0	2.5		x
	204-1	"	5+50	2.5	7.5		x
	206-1	℄ EMS	2+00	4.0	9.5		x
	301-1	℄ Pipe	1+85	1.0	3.0		x
	310-1	"	4+00	2.25	3.0	x	
	503-1	Toe downstream	100' R 10+00 ℄ Dam	1.0	1.75	x	
	504-1	"	100' R 8+50 ℄ Dam	1.0	4.3		x
	501-1	"	100' R 12+50 ℄ Dam	1.0	3.9		x
					Total	4	16

Original to Soils Laboratory
Copy to F and WP Unit
State Conservationist

Sheet 5 of 5 Sheets

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

WATERSHED	SUBWATERSHED	COUNTY	STATE
Pohick Creek	Rabbit Branch	Fairfax	Virginia

SITE NO.	SITE GROUP	STRUCTURE CLASS	INVESTIGATED BY: (SIGNATURE OF GEOLOGIST)	DATE
4	1	c		5/70

INTERPRETATIONS AND CONCLUSIONS

1. Cutoff should be made into hard mica schist (below backhoe refusal), up to the top of the dam. Care should be taken not to disturb sewer locations.

2. A clay cushion may be needed along the upstream two-thirds of the pipe to prevent differential settling due to the uneven rock line.

3. All rock in the spillway should be rippable. This is indicated by seismic tests on this site during the planning stage and by ripping operations on nearby site 7, where Wissahickon schist was ripped more than 30 feet.

4. There should be adequate borrow to construct the embankment. Good core material is present in the spillway, in lower hillslopes, and in top layers of alluvium. Placement of borrow is given in the correlation chart.

5. All topsoil should be stockpiled for use as top dressing.

[illegible]

[illegible] Pohick Creek [illegible] 4 [illegible] Va. Prepared by J. W. Gaffney [illegible] 6/70

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Unif. [illegible]	[illegible]	[illegible] Compacted Use	Est. [illegible] Quantity [illegible]	[illegible]
S 0-1	1.0-1.75	CL ~~ML~~	103	0.5-5.5	ML-CL		Core	40,000	Alluviu
			107	0.8-3.0	ML		"		"
			109	2.0-4.0	ML		"		"
S 121-1	1.0-4.25	CL ~~ML-SM~~	101	0.5-3.0	ML-SM		Transition	90,000	Alluviu
			104	2.0-4.25	ML-SM		"		"
			105	1.0-4.5	ML-SM		"		"
			106	2.5-5.0	ML		"		"
			108	1.2-3.5	SM-ML		"		"
			114	2.0-3.5	SM		"		"
			115	0.5-2.25	ML-SM		"		"
			121	0.5-4.25	ML-SM		"		"
S 11-1	4.0-8.9	GP-GM	104	4.25-4.5	SM		Shell	90,000	Alluviu
			106	5.0-7.4	GM		"		"
			107	3.0-5.0	GM		"		"
			108	3.5-5.3	GM		"		"
			109	4.0-6.5	GM		"		"
			114	3.5-4.0	GM		"		"
			115	2.25-5.0	GM		"		"
			116	2.0-6.0	GM		"		"
			121	4.25-6.0	GM		"		"

Pohick Creek		4		Va.	J. W. Gaffney		6/70
DS 111-1	1.0-2.2	(CL-ML)	110	0.5-3.6	ML	Core	5,000±	Manor-Fairfax
DS 114-1	1.0-2.0	(CL-ML)	111	0.5-2.2	ML	"		"
			112	0.5-3.75	ML	"		"
			113	1.8-4.0	ML-CL	"		"
			114	0.5-2.0	ML	"		"
			118	1.75-3.5	CL	"		"
			119	1.5-4.2	CL	"		"
			120	1.75-4.25	ML	"		"
DS 117-1	1.75-5.25	GM	110	3.6-6.8	GM	Shell	5,000±	Manor C-horiz
			111	2.2-5.2	GM	"		"
			112	3.75-5.5	GM	"		"
			113	4.0-5.8	GM	"		"
			117	1.75-5.25	GM	"		"
			118	3.5-5.6	GM	"		"
			119	4.2-6.25	GM	"		"
			120	4.25-7.25	GM	"		"

(To Accompany Geology Report for In-Service Design Use)

Pohick
Creek Site No. 4 State Va. Prepared by J. W. Gaffney 6/70

Representative Sample for Lab.		Borehole Data from				Purpose of Proposed Use	Est. Avail Quantity cu. Yds.	Remarks
Depth (Feet)	Unified Class.	Hole No.	Depth (Feet)	Unif. Class.	Limits			
1.0-2.5	GC-GM	201	0.5-2.5	GM		Shell	2,000	high terrace alluvium
		202	0.75-1.5	GM		"		"
		203	0.5-2.5	GM		"		"
		204	0.5-2.5	GM		"		"
2.5-7.5	CL	201	2.5-5.5	CL		Core	5,000	Manor-Fairfax
		202	1.5-4.5	CL		"		"
		203	2.5-5.5	CL		"		"
		204	2.5-7.5	CL		"		"
		205	2.0-10.5	CL-ML		"		"
		206	0.5-4.0	ML		"		"
		207	2.5-4.75	CL		"		"
		208	0.75-3.5	CL		"		"
4.0-9.5	GM	201	5.5-10.5	GM		Shell	8,000	C-horiz Manor
		202	4.5-9.5	GM		"		"
		203	5.5-8.8	GM		"		"
		204	7.5-13.5	ML		"		"
		206	4.0-9.5	GM		"		"
		207	4.75-8.0	GM		"		"
		208	3.5-10.75	ML-GM		"		"
						TOTAL	245,000 yards	

SOIL CONSERVATION SERVICE - [illegible]

300 "J" Street, Lincoln, Nebraska 68508

SUBJECT: ENG 22-5, Virginia WP-08, Pohick Creek, Site 4 DATE: October 14, 1970
(Fairfax County)

TO: Louis S. Button, Jr., State Conservation Engineer
SCS, Richmond, Virginia 23240

ATTACHMENTS

1. Form SCS-354, Soil Mechanics Laboratory, 4 sheets.
2. Form SCS-128 & 128A, Consolidation Test Data, 1 test, 3 sheets.
3. Form SCS-127, Soil Permeability, 1 sheet.
4. Form SCS-355A, Triaxial Shear Test Data, 4 sheets.
5. Form SCS-352, Compaction and Penetration Resistance, 7 sheets.
6. Form SCS-130, Drain Materials, 1 sheet.
7. Form SCS-357, Summary - Slope Stability Analysis, 4 sheets.
8. Investigational Plans and Profiles.

INTRODUCTION

An 18-foot deep sewer line extends through the lower left abutment of the proposed embankment at the elevation of the channel bottom. Another sewer line is proposed through the right abutment.

DISCUSSION

FOUNDATION

A. Classification. The samples of the clayey silt alluvium from the surface 3 to 5 feet of the floodplain varied from moderately plastic CL (71W254 - 503-1) with a liquid limit of 41 and a plasticity index of 16, to a CL-ML (71W251 - 12-1) with a liquid limit of 26 and a plasticity index of 5. The samples of the underlying 2 to 5-foot thick layer of gray-brown quartz pebble and cobble gravel varied from a GP-GM with 11% fines to a GC with 21% fines. The bedrock underlying the floodplain and abutments is deeply weathered schist.

The 2 samples of the silty residual soils from the surface one to 12 feet of the abutments were moderately plastic CL materials. Liquid limits were 45 and 37 and plasticity indices were 19 and 14. The sample 71W248 (7-1) of the underlying weathered schist from the left abutment at Station 13+00 is a nonplastic SM with 38% fines.

B. Dry Unit Weight. Dry densities of the test specimens of the 3 undisturbed silty alluvial samples varied from 1.58 gm/cc to 1.67 gm/cc. Dry density of the silty colluvial sample 71W247 (6-1) was 1.59 gm/cc.

C. Consolidation. A one-dimensional consolidation test was made on the CL-ML alluvial sample 71W244 (310-1). The void ratio versus pressure curve plotted from the test data has a characteristic shape of a somewhat preconsolidated material for the existing overburden load. The percent consolidation curve plotted from the test data shows a consolidation potential of approximately 3% for the alluvium under the 5000 psf load of the proposed 40-foot high Class "C" embankment.

The underlying gravelly alluvium is expected to have similar or lower consolidation potential than the silty CL alluvium above.

D. Permeability. A falling-head permeability test on the CL-ML consolidation test specimen was extrapolated to yield a no-load permeability rate of approximately 0.001 ft/day.

The underlying gravelly alluvium is expected to have permeability rates ranging from 1.0 to 100.0 ft/day.

The water table was at a depth of 4 to 5 feet, generally at the top of the gravelly underlying layer.

E. Shear Strength. Consolidated undrained triaxial shear tests were made on 2 of the undisturbed foundation samples. The test data for the CL alluvial sample 71W249 (10-1) was interpreted to yield total stress shear parameters of ϕ = 15.5° and c = 700 psf. Moisture contents of the test specimens, which were soaked for 7 days, were 99% to 100% of theoretical saturation. The test data for the CL or ML sample 71W254 (503-1) was interpreted to give total stress shear parameters of ϕ = 20.5° and c = 1100 psf. The 1.4-inch diameter specimens were tested at natural moisture content, which was 97% to 99% of theoretical saturation.

The gravelly materials underlying the thin CL and CL-ML surface layer are expected to have minimum shear parameters of ϕ = 35° and c = 0 psf.

EMBANKMENT

A. Classification. The borrow materials consist of moderately plastic, fine-grained CL and coarse-grained GC, GC-GM, GP-GM, and GM that are of alluvial, colluvial, and residual origin. Liquid limits of the CL borrow materials varied from 29 to 42, and the plasticity indices varied from 10 to 18. The fine contents of the coarse-grained samples varied from 11% to 43% and the gravel contents varied from 71% to 32%. The percent passing the No. 4 screen varied from 29% to 43%.

B. Compacted Dry Density. Standard Proctor compaction tests (ASTM D-698, Method A) were made on the minus No. 4 fraction of 7 of the borrow samples submitted. Maximum dry densities varied from 107.0 pcf to 112.5 pcf for the fine-grained CL materials and from 102.5 pcf to 123.0 pcf for the minus No. 4 fraction of the coarse-grained materials.

C. Permeability. Permeability of the fine-grained CL materials placed at 95% of Standard density is expected to be very low. Permeability of the coarse-grained materials is expected to range from low for GC sample 71W255 (504-1) with 43% fines to very high for the GP-GM sample 71W250 (11-1) with only 11% fines.

D. Shear Strength. Consolidated undrained triaxial shear tests were made on 2 of the CL borrow samples. The 1.4-inch diameter test specimens were molded slightly wet of optimum to 95% of Standard Proctor density and then soaked for 7 days to saturate.

The shear test data for the moderately plastic CL sample 71W257 (204-1) was interpreted to give total stress shear parameters of $\phi = 16°$ and $c = 1300$ psf. The triaxial specimens, when tested, had moisture contents that were 92% to 94% of theoretical saturation.

The shear test data for the low-plasticity CL sample 71W262 (121-1) was interpreted to give total stress parameters of $\phi = 23°$ and $c = 700$ psf. The triaxial specimens, when tested, had moisture contents that were 91% to 95% of theoretical saturation.

The shear parameters of the coarse-grained materials are expected to vary widely as the fines content and gravel content vary. Shear parameters of the gravelly material like the GC sample 71W255 (504-1) with the minus No. 4 fraction at 95% of Standard density are expected to be similar to the CL sample 71W262 (121-1) that was tested. Shear parameters of the clean gravelly materials like the GP-GM sample 71W250 (11-1) are expected to have minimum values of $\phi = 35°$ and $c = 0$ psf for material placed using Class "C" compaction.

E. Consolidation. The average consolidation potential of the proposed 35-foot high floodplain section is estimated at 2% for a CL center section placed at 95% of Standard density.

STABILITY ANALYSIS

The maximum section was analyzed using a modified Swedish circle method and the sliding block method of the Department of Navy Bureau of Yards and Docks (DM-7 Design Manual). Shear parameters of $\phi = 23°$ and $c = 700$ psf were used for the embankment, and $\phi = 35°$ and $c = 0$ psf were used in the foundation. A safety factor of 1.8 was obtained for the full drawdown analysis of the $2\frac{1}{2}$:1 over 3:1 upstream slope with a 10-foot berm at

elevation 287.0 (trial No. 3 in slope stability summary in the attachments). The downstream 2½:1 slope without a drain yielded a safety factor of 1.63 (trial No. 5).

The floodplain section was analyzed using a modified Swedish circle method. Safety factors obtained for this analysis were 1.79 for the 2½:1 over 3:1 upstream section, and 1.78 for the 2½:1 downstream section.

A dry slope condition is required for stability (infinite slope analysis) for a 2½:1 downstream slope with shear parameters of ϕ = 35° and c = 0 psf.

RECOMMENDATIONS

A. Centerline Cutoff. A 20-foot wide cutoff with 1:1 side slopes extending down through the alluvial silts and gravels into the weathered schist bedrock is recommended to reduce the quantity of seepage through the alluvium. Backfill the cutoff with high-plasticity CL materials like Sample 71W257 (204-1) to avoid piping through the adjacent coarse, open-work alluvial gravels similar to the GP-GM sample 71W250 (11-1). Place the backfill wet of optimum and compact to a minimum dry density of 95% of Standard.

B. Drainage. A 4 to 6-foot deep foundation and embankment drain at c/b = 0.6, extending down through the fine-grained surface alluvium into the gravelly underlying layer, is recommended to insure a dry slope condition for the 2½:1 downstream slope.

A coarse-grained drain material with a low co-efficient of uniformity will be required to have sufficient capacity to drain the cleaner gravels. ASTM Road Aggregate No. 78 is suggested. See the SCS drain materials form SCS-130 in the attachments for gradations of materials.

C. Principal Spillway. The proposed location at dam ℄ station 9+50 appears satisfactory. Pipe elongation calculations, for the 40-foot high embankment (B = 225') over 10 feet of compressible foundation with a 3% consolidation potential, show a horizontal strain of approximately 0.002 ft/ft according to the method of TR No. 18 Rev.

Provide a minimum pipe camber of 0.5 foot.

Use a ϕ angle of 28 degrees for conduit loading calculations.

D. Embankment Design. The following are recommended:

1. Selectively place the fine-grained CL and CL or ML materials in the center and upstream sections, and the gravelly materials in the downstream section with the cleaner gravels in the outer shell.

Subject: Corydon Dam, Indian Creek Unit -

2. Compact the fine-grained materials to a minimum density of 95% of Standard.

3. Compact the gravelly materials using a methods specification.

4. Provide 2½:1 over 3:1 upstream slopes, with a 10-foot berm at elevation 287.0, and a 2½:1 downstream slope.

5. Provide an overfill of 0.7 foot across the floodplain to compensate for residual foundation and embankment settlement.

B. Other. The sewer backfill in the left abutment should be examined when the core trench is open to determine if there is a need for seepage control measures deep in the trench near the channel elevation.

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Attachments

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POHICK CREEK WATERSHED
FAIRFAX COUNTY, VIRGINIA

PL 566 DAM SITE #4

OPERATION AND MAINTENANCE PLAN

prepared by Fairfax County
Department of Public Works
with assistance from
the USDA, Soil Conservation Service

May, 1979

OPERATION AND MAINTENANCE PLAN
PL 566, SITE 4
Pohick Creek Watershed, Fairfax County, Virginia

I. Pertinent Information on the Structure

Drainage area	2,432 acres
Height of dam	42.0 feet
Length of dam	980 feet
Volume of fill (zoned earth embankment)	118,240 cubic yards
Surface area of permanent pool	38 acres
Surface area of flood pool at crest of emergency spillway	99 acres
Flood storage at crest of emergency spillway	839 acre feet
Permanent pool storage	244 acre feet
Total storage at crest of emergency spillway	1,083 acre feet
Total sediment storage	244 acre feet

Pertinent Dates:

Contract for dam	July, 1976
Construction completed	July 26, 1976
Final inspection	July 11, 1977
Seeding of dam and borrow areas	June, 1977
Water control gate closed	January 10, 1979

II. Area of Responsibilities for Operation and Maintenance

The Fairfax County Board of Supervisors is responsible for financing and performing operation and maintenance of the dam, principal spillway, which includes the riser, pipe and impact basin; and the emergency spillway.

The Fairfax County Board of Supervisors has delegated this responsibility to the Fairfax County Department of Public Works (DPW).

III. Operation and Maintenance Inspections and Follow-Up Procedures

A. Inspections

An annual on-site inspection of the dam, principal spillway and appurtenances and emergency spillway will be made during the month of October. Other inspections will be made following severe storms to determine any storm damage. The inspection will encompass, but not be limited to, all items on the attached check list. The following agencies and organizations will be invited to participate in the inspection:

Fairfax County Department of Public Works
  Utilities Planning and Design Division
  Maintenance and Construction Division
Fairfax County Department of Environmental Management
  Plan Review Branch
Fairfax County Park Authority
Northern Virginia Soil and Water Conservation District
USDA Soil Conservation Service, District Conservationist and Area Engineer

III. Operation and Maintenance Inspections and Follow-Up Procedures (continued)

B. Scheduling Inspection

The PL566 coordinator within Fairfax County Department of Public Works will be responsible for scheduling the inspection and notifying participants prior to October inspections.

C. Inspections Report

An inspection report of findings and recommendations will be made within 10 days after the inspection. This report will be prepared and signed by the County PL566 Coordinator and co-signed by the SCS District Conservationist. Copies will be distributed to all participants and the heads of all concerned agencies and departments within the County. The report will indicate the maintenance needs and specify the agency that will perform the maintenance.

D. Maintenance Follow-Up

The required maintenance will be performed within a reasonable period of time following the inspection and a follow-up report sent to all concerned agencies. The SCS Fairfax Field Office will be informed upon completion of the required maintenance.

E. Safety

During the inspection, members of the team will inspect for any unsafe conditic resulting from inadequate or improper operation and maintenance.

IV. Operation and Maintenance Items

A. Operation Items

1. Water control gate - The gate will be operated at least once every 3 years to assure that it is operational.
The channel guides will be lubricated with cup grease where necessary.
The floor stand will be lubricated as deemed necessary.
Gate and appurtenances will be kept painted as deemed necessary by annual inspections.

2. Motor vehicle traffic will not be allowed on the dam, spillway or any portion of the structure except for operation and maintenance purposes. Vehicle access will be controlled by the use of barriers and police surveillance when necessary.

3. Any violation of State or County laws, ordinances and codes that are observed will be reported to the proper authority so that pollution or contamination of the lake waters, which would have adverse effects on fish and wildlife resources, is prevented.

B. Maintenance Items

1. Vegetation:

Eroded areas will be restored and reseeded as needed.
Vegetation will be mowed as often as necessary to control undesirable weed growth and to maintain optimum cover. The grass will be mowed to not less than 4 inches in height.

IV. Operation and Maintenance Items (continued)

B. Maintenance Items (continued)

1. Vegetation (continued)
   a. Soil tests will be taken by the DPW as often as necessary as determined by appearance of plant vigor but at not less than 3-year intervals.
   b. Fertilizer and lime will be applied according to results of soil tests.

2. Earth Dam:
   a. The foundation drains will be inspected for proper functioning. They will be cleaned out if necessary.
   b. Any eroded areas occurring in the emergency spillway and on the embankment will be revegetated and soil replaced if necessary.

3. Structures:
   a. The impact basin will be kept free of rock and debris.
   b. The trash rack and all metal work will be kept in working condition and protective coating restored if necessary.

4. Access Road:
   a. The access road will be maintained in a proper manner to allow for the continual ingress and egress of maintenance vehicles.
   b. The gates and locking devices will be kept in good working condition.

CHECKLIST FOR O&M INSPECTION -- PL 566 DAM #4

		YES	NO	REMARKS
I.	Dam			
	a. Evidence of seepage areas on downstream slope of dam			
	b. Evidence of seepage areas at downstream toe of dam			
	c. Evidence of slope change or slippage on downstream slope of dam			
	d. Existence of eroding areas			
	e. Vegetation of good quality			
	f. Maintenance of vegetation has been properly performed			
	g. Existence of woody vegetation or debris from flooding on the dam			
	h. Other			
II.	Principal Spillway Riser and Appurtenances			
	a. Water control gate is operational			
	b. Metal surfaces in good condition			
	c. Condition of concrete surfaces of risers, inside and out, any signs of deterioration or cracking			
	d. Trash rack bars and guards in place			
	e. Any trash collected in or around riser			
	f. Manhole cover in place			
	g. Other			
III.	Emergency Spillway			
	a. Vegetation of good quality			
	b. Maintenance of vegetation has been properly performed			
	c. Existence of eroding areas			
	d. Other			

		YES	NO	REMARKS
IV.	Impact Basin			
	a. Free of debris and rock			
	b. Condition of concrete, spalling or cracking			
	c. Condition of joint of principal spillway pipe and back wall of impact basin			
	d. Toe drains appear to be open and functioning			
	e. Small animal guards on toe drains in place			
	f. Any indication of solid material coming from toe drains			
	g. Other			
V.	Channel Below Impact Basin			
	a. Rip-rap in place as shown on as-built plans			
	b. Any erosion occurring in channel			
	c. Any siltation occurring in channel			
	d. Is vegetation on channel immediately below impact basin adequate?			
	e. Downstream changes affecting functioning of structure			
	f. Other			
VI.	Lake and Shoreline			
	a. Any large debris in lake or on shoreline which could wash down against riser			
	b. Is there evidence of excessive sediment in the lake?			
	c. Other			
VII.	Upstream Watershed			
	a. Any existing or proposed new development not in accordance with original land use plan			
	b. Any major existing or proposed new drainage improvement which could [illegible]			

		YES	NO	REMARKS
VIII.	Access Road			
	a. In good condition			
	b. Gate and locking device operational			

APPENDIX V

REFERENCES

Reference

1. U S Weather Bureau and U S Army Corps of Engineers, "Seasonal Variation of Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24 and 48 Hours", Hydrometeorological Report No. 33. Washington, D.C., April 1956.

2. Clark, C. O., "Storage and the Unit Hydrograph", Trans. American Society of Civil Engineers, Vol. 110, PP. 1419-1488, 1945.

3. Hershfield, David M., "Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years", Cooperative Studies Section, U S Weather Bureau Technical Paper No. 40, Washington, D.C., 1961

4. Recommended Guidelines for Safety Inspection of Dams, Department of the Army, Office of the Chief of Engineers, Washington, D.C. 20314